FINAL
Environmental Indicator Inspection Report
For
Solid State Scientific, Inc.
160, 200, and 201 Commerce Drive
Montgomeryville, PA 18936
EPA ID # PAD 002 278 331

PADEP CONTRACT NO. ME-359186
WORK REQUISITION NO. 30-011

Submitted to:

Commonwealth of Pennsylvania
Department of Environmental Protection
Central Office
Rachael Carson State Office Building
Harrisburg, PA 17105-8471

United States Environmental Protection Agency
Region III
1650 Arch Street
Philadelphia, PA 19103-2039

DECEMBER 2002

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United States Environmental Protection Agency, Region III Corrective Action Program

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Prepared By

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November 2002

GTAC3/EI-CME/0210
E017-FINAL REPORT

Table of Contents

RCRA SITE INSPECTION REPORT
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160, 200, AND 201 COMMERCE DRIVE
MONTGOMERYVILLE, PA 18936

Purpose: To gather relevant information from the current property owners/operators of the former Solid State Scientific, Inc. (SSS) facility in order to determine whether or not human exposures and groundwater releases are controlled, as per Environmental Indicator Determination forms.

Documentation Review: Prior to the meeting, Ms. Roxanne Clarke of Foster Wheeler Environmental Corporation (Foster Wheeler) conducted an extensive record search at the Pennsylvania Department of Environmental Protection (PADEP) Conshohocken Office. The U. S. Environmental Protection Agency (USEPA) Region III conducted a review of their files, and pertinent information was provided for this report. Additional information was provided by Ferro Electonic Materials, Moyco Precision Abrasives, Inc., Mid-Lands Chemical Company, and Allegro Microsystems.

Attendees:

Name	**Organization**	**Phone Number**	**E-Mail address**
Maura Lavin	Foster Wheeler	(215) 702-4060	mlavin@fwenc.com
Roxanne Clarke	Foster Wheeler	(215) 702-4003	roclarke@fwenc.com
Camelia Draghiciu	PADEP	(610) 832-	cdraghiciu@state.pa.us
Jennifer Wilson	PADEP	(610) 832-6170	jewilson@state.pa.us
Craig Dare	Horsham Valley Development Corporation – Lotz Realty	(215) 674-5950	craigdareremax@aol.com
Chuck Picardi	Moyco Precision Abrasives, Inc.	(215) 855-4300	chuck@moycotech.com
Linda and Scott DeGoler	Current Owner of Building #1 Property and Former Owner of Mid Lands Chemical Company	(402) 578-8001	Unknown
Wendy Cooper	Allegro Microsystem	(215) 657-8400	Unknown

Meeting Summary: A meeting at the former Solid State Scientific (SSS) Montgomeryville facility was held on July 9, 2002. Prior to the meeting Foster Wheeler spoke with Wendy Cooper of Allegro regarding the former SSS property. Allegro purchased SSS subsequent to the subdivision and sale of the Montgomeryville facility.

Maura Lavin 772-781 3413

Survey

Foster Wheeler and PADEP first met with Craig Dare of Lotz Realty. Lotz Realty represented the Horsham Valley Development Corporation (HVDC) who owns the property at 160 Commerce Drive (former SSS Building #2). This property is currently leased to Ferro Electronic Materials – EMCA (Ferro). Foster Wheeler and PADEP next met with Chuck Picardi of Moyco Precision Abrasives, Inc. (Moyco) who own and operate the property at 200 Commerce Drive (former SSS Building #3). An attempt to meet with Mid-Lands Chemical Company (Mid-Lands) was made but refused. This company is located at 201 Commerce Drive (former SSS Building #1). Foster Wheeler later spoke with Linda and Scott DeGoler who are previous owners of Mid-Lands. Although the business has been sold, they still own the property.

Ms. Maura Lavin, the Foster Wheeler Team Lead, presented Moyco, the only owners/operators met with during the site visit, with information regarding USEPA Region III's Corrective Action process, the Environmental Indicator Assessment Program and the legislation driving this program. Under this investigation, USEPA Region III is focusing on two interim Environmental Indicators to evaluate whether any unacceptable risk to human health and the environment is ongoing at each priority facility. The two indicators are determining if human exposures are controlled and groundwater releases are controlled. Issues discussed with the facilities were as per a February 15, 2002 letter sent from PADEP Central Office to the Solid State Scientific Willow Grove facility. None of the current owners/operators received PADEP notification of the Environmental Indicator Assessment Program.

Information regarding current and past operations at each of the three properties was discussed during the site visit or during subsequent phone conversations. The visit to each property included a tour of the site, except for 201 Commerce Drive where access was denied. Photographs were taken during the site tours and can be found in Appendix A.

A. Location and Operational History of the Facility, Including all Wastes Generated at the Facility and their Management.

The former Solid State Scientific (SSS) facility was located at the corner of Commerce Drive and Enterprise Road in Montgomeryville, PA. The facility consisted primarily of three buildings in the Montgomeryville Industrial Park. The facility no longer exists and the property has been subdivided into three properties, which each correspond to one of the SSS buildings. Located at 201 Commerce Drive is SSS Building #1, which is currently privately owned, and operated by Mid-Lands Chemical Company. The HVDC own the SSS Building #2. Ferro, who recently purchased the original tenant EMCA, currently lease this property which is located at 160 Commerce Drive. At 200 Commerce Drive is SSS Building #3, which is currently owned and operated by Moyco.

The three properties are located in an industrial park. Neighboring properties are mostly industrial and commercial with some residences in the general vicinity. The site location map is included as Figure 1 in Appendix B. More detailed site maps are included as Figures 2, 3, and 4.

The SSS Montgomeryville facility was a semiconductor manufacturing facility that produced large-scale integrated circuits. These circuits were used in watches, clocks, smoke detectors, computers, space and telecommunications, military communications, and various other uses.

The circuits were produced on the surface of a silicone wafer with each wafer containing as many as 800 circuits. The wafers were mass-produced using photographic techniques, high temperature heat treatments, and chemical processing. (December 1981)

Two of the SSS buildings processed the silicone wafers and the third contained the photo processing operation. The facility utilized a variety of acids, solvents, and photo-chemicals. All spent acids and low pH rinse streams were neutralized with sodium bicarbonate before being discharged to a tributary of Park Creek. Used solvents were transported to a neighboring chemical company for reclamation. (April 1976)

On November 19, 1980, SSS submitted a Part A Application. This application listed the facility as an existing facility with a start of operations date of July 5, 1980 as well as a new facility with a start of operations date of April 20, 1982. A Part A Application submitted in 1982 listed the facility as an existing facility with a start of operations date of August 14, 1967. (January 19, 1982) Due to the fact that files for SSS date back to the 1970s the start date for this facility is presumably August 14, 1967. However, this assumption could not be confirmed due to the fact that SSS no longer exists.

During an inspection on February 28, 1975, it was discovered that SSS was discharging industrial wastes without a permit. Samples collected from two discharge points found the discharges to be contaminated. The facility was notified that a permit for these discharges was required. There was a discharge from a small pipe which contained BOD at 350 mg/L and COD at 4,830 mg/L. (March 24, 1975) As per correspondence and conversations, PADEP agreed with the facility's position that a major portion of the problem was caused by the solvent spill from the old solvent tank. The contents of this tank were pumped out and the tank was scheduled to be removed and disposed off-site. A new tank was installed in this location. During installation a portion of contaminated soil was removed. Arrangements were made to have the rest of the soil removed in April 1975. SSS felt that the steps outlined would correct the effluent problems at the site. It was agreed that SSS would submit an application for a discharge permit. (March 27, 1975) On October 16, 1978 an application to discharge 0.047 million gallons per day of treated industrial waste into an unnamed tributary of Park Creek was submitted. (November 1, 1978)

In October 1975, PADEP was notified that SSS had contracted Robert Rosen Associates for assistance with their water quality problems and their dumping permit. In 1976 a Waste Characterization Study and Conceptual Design Report were prepared for the site with the following analytical results. Note that the units were not expressed in the source document. (February 23, 1976)

Parameter	**12/30/75 001 Sample**	**12/31/75 001 Sample**
Acidity (as $CaCO_3$)	116	272
Total Solids	263	371
Dissolved Solids	258	351
Suspended Solids	5	20
Chlorine	4.5	3
Fluoride	42.52	55.06

Sulfate (as SO_4)	98	172
Aluminum	1	1
Chromium, Hexavalent	<0.005	<0.005
Parameter	**12/30/75 001 Sample**	**12/31/75 001 Sample**
Chromium, Trivalent	<0.005	<0.005
Nickel	<0.01	<0.01
Phenol	1.06	<0.004
BOD	14	8
COD	27	50
Nitrate	0.46	3.7
Total Phosphorous (as P)	6.6	4.98

The report concluded that the production of semi-conductors at the SSS facility generated several small wastewater discharges having low pH and high fluoride content. The current treatment of the wastes prior to discharge was found to be inadequate to meet PADEP discharge guidelines. The report recommended treatment consisting of fluoride removal and acid disposal. (April 1976)

A meeting was held on March 22, 1979 to discuss the pending NPDES application. PADEP and SSS agreed that the NPDES permit would be revised and resubmitted. It was decided that P-005-A and P-005-C (300) would be discharged to the pond. P-000 and P-001 (200) would be combined and the discharge would go to an unnamed tributary of Park Creek. P-004-A and P-004-C (400) would continue to be discharged to the existing anaerobic system. The following table summarizes the facility discharges. (April 4, 1979)

Present Description	Future NPDES Description	Future Construction Permit Description
Reverse Osmosis Reject Water		
001	200	P-001
005-A	300	P-005-A
004-A	400	P-004-A
Non-Contact Cooling Water		
000	200	P-000
005-C	300	P-005-C
004-C	400	P-004-C
Process Rinse (acid waste generated from etching and stripping operations)		
002 and 003	100	P-002 and P-003
004-B	100 or 500	P-004-B
005-B	100	P-005-B

Craig S. Phillips, P.E. was retained by SSS to design a wastewater treatment plant for process effluent streams. This wastewater treatment plant was to be designed to facilitate operations in Building #2 and Building #3. Building #1 was sold in 1979 and the new management was considering a separate treatment system for their process water. A June 11, 1979 letter indicated that SSS anticipated expanding the Montgomeryville facility. It was expected that construction would begin in April 1980 and upon completion in 1981 the facility would have doubled their size. No further mention of expansion was found in PADEP or USEPA files. It is unclear if the expansion took place.

SSS submitted the revised NPDES permit on July 9, 1979. The facility was listed as utilizing 15,000 gallons per day of water for non-contact cooling, 130,000 gallons per day for process water, 9,500 gallons per day for sanitary water, and 25,000 gallons per day for reverse osmosis reject water. Final discharge was to a tributary of Park Creek.

A PADEP internal review memo for the NPDES permit application indicated that only Discharge 100 would require treatment. It was noted that the NPDES permit was to be a short-term permit with effluent limits based on water quality criteria. (December 1979) SSS was issued a NPDES permit, which took effect January 16, 1980, to cover four discharges to an unnamed tributary of Park Creek. Discharge 100 consisted of effluent from a Wastewater Treatment Plant. The effluent consisted of treated acid and rinse water from Building #2. Discharge 200 consisted of reverse osmosis reject water from Building #2. Discharge 300 consisted of reverse osmosis reject water and non-contact cooling water from Building #3. Discharge 400 consisted of non-contact cooling water from Building #2. (November 27, 1984)

According to a September 1980 letter SSS was negotiating a consent order with PADEP to settle past violations. The facility however did not notify PADEP of their acceptance and an enforcement meeting was scheduled. (September 11, 1980) At the meeting it was agreed that SSS would pay $15,000 in fines for past violations and that no new penalties would be assessed provided that the facility submitted a Part II permit application and that its discharge was in compliance by the date scheduled in the application. The Part II Application was submitted April 13, 1981 with a scheduled start-up date for the treatment facility of July 1, 1982. An October 6, 1981 PADEP letter indicated that, due to a design mistake on the part of SSS's engineering consultant, the facility would not be able to meet the start-up date previously agreed upon. According to an earlier PADEP memo, the facility had a history of problems with consultants causing them to fail to meet scheduled compliance dates. (September 15, 1981) PADEP proposed a Consent Order and Agreement (CO&A) to settle this violation.

On November 23, 1981, PADEP issued a letter to SSS withdrawing the offer to settle with a CO&A. This decision was made in light of new information provided by Craig Phillips. PADEP informed SSS that they must be in compliance with their NPDES permit by July 1, 1982. SSS in turn requested a meeting to discuss the withdrawal of the CO&A offer. The facility indicated that they were working, in part with Betz-Converse-Murdoch (BCM) Engineers, on a package to be in compliance by October 1, 1982. (October 12, 1981 and December 11, 1981)

BCM Engineers had redesigned the system to include a deionization process. Two independent bidders agreed that the system could not operate within the required limits. On November 17, 1981 BCM Engineers were released from any further design and construction responsibilities. SSS contacted both Memtek and Culligan and it was determined that neither of their systems could successfully treat the effluent to the discharge criteria set by PADEP. At the request of SSS, PADEP renewed the offer to settle their dispute by means of a CO&A. (December 11, 1981 and December 17, 1981)

On January 14, 1982, PADEP issued a CO&A to SSS to settle violations of NPDES permit PA0050130. According to the CO&A, SSS had discharged wastes containing contaminant levels as high as: 525 mg/L of fluoride, 1,440 mg/L of dissolved solids, 1.5 mg/L of phenol, 0.68 mg/L of zinc, and 0.45 mg/L of hexavalent chromium since September 3, 1980. This discharge also had a pH as low as 1.8. It was agreed in the CO&A that SSS would pay $2,000 per month of non-compliance with the NPDES permit beginning October 1, 1982 and ending December 31, 1982. Non-compliance was for no reason to extend beyond December 31, 1982.

A November 1982 PADEP letter indicated that the facility was not compliant with their NPDES permit in October 1982. As required by the CO&A, SSS was required to pay $2,000 per month for each month of non-compliance with the NPDES permit. Since the facility had yet to attain compliance, the $2,000 check was required. No further mention was made, in PADEP or USEPA files, as to when compliance with the NPDES permit was achieved.

According to the 1981 Preparedness, Prevention, and Contingency (PPC) Plan, the three discharges from the facility were monitored and reported to PADEP and USEPA. However, no monitoring results were found in PADEP or USEPA files. Solvents and concentrated acid wastes generated at the plant were transferred by truck to an approved site for incineration. Photographic bleaches, dyes, and solvents were transported by truck to an approved site for pressure filtration and disposal. (December 1981)

USEPA was first notified of hazardous waste activity in August 1980. This first notification listed the facility as a generation and treat/store/dispose facility. Wastes listed include D000, D001, D002, D003, F001, F002, F005, P010, U002, U070 (deleted 2/2/81), U071 (deleted 2/2/81), U072 (deleted 2/2/81), U134, U140, U154, U188, U220, U226, U229, and U239. (August 15, 1980)

The 1980 Part A Application listed 5,500 gallons in storage containers, 1,550 gallons in storage tanks, and 85,000 gallons per day in treatment tanks. The application also listed 4.5 tons of U002 wastes, 4.55 tons of U154 waste, 0.93 tons of U188 waste, 4.1 tons of U229 waste, 7.96 tons of U239 waste, 2 tons of U226 waste, 6.6 tons of D001 waste, and 6 tons of D002 waste in storage containers and tanks as well as 4.2 tons of U134 waste in treatment tanks. This application indicated that a NPDES permit (PA0050130) was issued to the facility as well as a RCRA permit (PAD002278331). Neither of these permits were found in PADEP or USEPA files.

In January 1981, SSS submitted revisions to RCRA Permit PAD002278331. In a January 21st letter the facility indicated their intention to be permitted to transport wastes between facilities for treatment. The facility also requested the removal of waste codes U070, U071, and U072 from the permit. In a January 23rd letter the permit was amended to include 66.6 pounds of D001 waste and 60.6 pounds of D002 waste.

USEPA issued interim status to SSS for the storage of 5,500 gallons in storage containers, the storage of 1,550 gallons in storage tanks, and the treatment of 85,000 gallons per day in treatment tanks. The waste codes permitted to be treated and stored at the facility were U002, U134, U154, U188, U072, U229, U239, U226, D001, and D002. (July 27, 1981)

A revised Notification of Hazardous Waste Activity was submitted on January 19, 1982. The facility continued to be listed as a generation and treat/store/dispose facility. The list of hazardous wastes was shortened to D001, D002, F002, F003, and F005.

A revised Part A Application was submitted on January 19, 1982. The application listed 5,500 gallons in storage containers and 2,500 gallons in storage tanks. The application also listed 3.11 tons of D001 waste, 230 tons of D002 waste, 1.2 tons of F002 waste, 3 tons of F003 waste, and 1 ton of F005 waste in storage containers and tanks. On February 18, 1982 USEPA revised the interim status for the SSS facility. The facility was permitted to use storage containers (5,500 gallons) and storage tanks (2,500 gallons).

USEPA requested the submission of a RCRA Part B Application from SSS in a letter dated March 4, 1983. It is unclear if and when the Part B Application was submitted, but according to a November 9, 1984 inspection the facility did not intend to seek a permit. As a result, wastes could only be stored for a period of less than 90 days at the facility. In December 1984 PADEP acknowledged the receipt of communication concerning the withdrawal of the hazardous waste application. PADEP indicated that the application could not be returned until an approved closure plan for the facility was submitted. (December 14, 1984) In a January 7, 1985 letter PADEP acknowledged receipt of the closure plan dated December 1984.

In March 1985, PADEP requested additional information from SSS for use in the review of the December 1984 closure plan. Upon receipt of the information the plan would be deemed approved and closure could proceed. (March 11, 1985) On March 27, 1985 PADEP approved the closure plan and returned the Part A Application to SSS. The facility was then considered a generator only and interim status as a hazardous waste container storage, tank storage, and tank treatment facility was terminated. A revised closure plan was submitted and PADEP authorized the facility to proceed with the closure on March 28, 1985.

On September 16, 1985 SSS notified PADEP that the closure of the hazardous waste treatment and storage facilities located at Building #2 were complete. Certificates of closure were submitted at this time. A PADEP inspection of the closed facilities was conducted on September 19, 1985. It was determined that closure was in accordance with the approved plan and PADEP approved the closure of the Montgomeryville plant. (September 26, 1985)

B. Description of all Solid Waste Management Units (SWMUs) and/or Areas of Concern (AOCs)

Scrubber

A plan approval for the installation of scrubbers to control the fume emissions from the production of silicone wafers was received on January 9, 1981. The scrubber blowdown was sent to the wastewater treatment plant. (April 24, 1981) On January 22, 1982 Operating Permit #46-399-048 was issued for the Semi-Conductor Manufacturing Process (Scrubber). The permit required the facility to maintain a pH of 10 to 11 by adding caustic solution to liquid. This permit was to expire on February 28, 1986. No renewal of the permit was found in PADEP or USEPA files as SSS ceased operations around the time the permit expired. The approximate location of this scrubber is unknown. No documentation was found indicating that a release, sampling, or remediation has occurred relating to this scrubber.

Wastewater Treatment Plant and NPDES Discharges

During an inspection on February 28, 1975 it was discovered that SSS was discharging industrial wastes without a permit. Samples collected from two discharge points found the discharges to be contaminated. The facility was notified that a permit for these discharges was required. On October 16, 1978 an application to discharge 0.047 million gallons per day of treated industrial waste into an unnamed tributary of Park Creek was submitted. (November 1, 1978)

In each building at the SSS facility, city water was treated by a reverse osmosis/ion exchange system. Deionized water was used for all rinses and reagent preparation throughout the processes. The reject streams from the reverse osmosis operation were discharged without treatment to the receiving stream. The reverse osmosis/ion exchange system in Building #2 was operated on a 50% reject rate. It approximately doubled the concentration of the solids contained in the city water feed.

According to a June 11, 1979 letter, Craig S. Phillips, P.E. was retained by SSS to design a wastewater treatment plant for process effluent streams. This wastewater treatment plant was to be designed to facilitate operations in Building #2 and Building #3. Building #1 was sold in 1979 and the new management was considering a separate treatment system for their process water.

A PADEP internal review memo for the NPDES permit application indicated that only Discharge 100 would require treatment. It was noted that the NPDES permit was to be a short-term permit with effluent limits based on water quality criteria. (December 1979) SSS was issued a NPDES permit, which took effect January 16, 1980, to cover four discharges to an unnamed tributary of Park Creek. Discharge 100 consisted of effluent from a Wastewater Treatment Plant. The effluent consisted of treated acid and rinse water from Building #2. Discharge 200 consisted of reverse osmosis reject water from Building #2. Discharge 300 consisted of reverse osmosis reject water and non-contact cooling water from Building #3. Discharge 400 consisted of non-contact cooling water from Building #2. (November 27, 1984)

In April 1981 Solid State Scientific submitted Industrial Waste Application #4681202. The application proposed a treatment plant with lime precipitation, filtration, ion exchange, and neutralization to remove metals and fluoride. If operating properly the treatment plant should have produced an effluent, which met all NPDES requirements except TDS. SSS believed that a membrane filtration unit was the best option to treat TDS in the discharge. (September 14, 1981)

The treatment of wastewater converted fluorides to an insoluble form. Ferric chloride was added in a primary reaction tank and calcium chloride was added in a secondary reaction tank. The pH was raised to 12-13. The wastewater was then pumped to a "Main Tank." Water from the main tank was pumped through the tubular membrane bundle. Ninety percent of the flow entering the membrane unit returned to the Main Tank. The other ten percent was effluent. A sludge layer formed in the "Main Tank" which was drained to thicken and then disposed. (September 14, 1981)

The facility believed that its system would be able to meet the TDS limits without additional treatment. SSS proposed to install a full size system and to try to meet the TDS limits. If the system alone failed to meet the TDS limits a reverse osmosis system would be installed. SSS expected to be in compliance by July 1, 1982. (September 14, 1981)

A status report was submitted in October 1981 regarding the wastewater treatment plant. The report indicated that the facility had been working with Memtek Corporation and Winokur Water Systems on the design of the wastewater treatment facility. Pilot tests were not completely successful and Memtek was forced to redesign the chemistry. Winokur also experienced problems processing the wastewater. Additional pilot tests were planned and both Memtek and Winokur intended to have the pilot plants operating by October 20th. No further status reports were found in PADEP or USEPA files. SSS also indicated that they were looking to eliminate all phenol-based material from the manufacturing process by the end of the first quarter of 1982. SSS had been testing alternatives since January 1981. It is unclear if SSS's intention to eliminate phenol was successful. (October 19, 1981)

In a November 5, 1981 letter it was indicated that the proposed treatment facility would not meet the NPDES permit's TDS requirements of 638 lb./day (average loading), 1,013 lbs./day (maximum loading), 1,700 mg/L (average concentration), and 3,970 mg/L (maximum concentration).

On June 10, 1982, SSS submitted a Water Pollution Control Application. This application indicated that untreated wastewater was generated at Building #2, which was discharged to a truck for removal. There was an existing scrubber discharge of 0.008 mgd of untreated wastewater. There was a proposed discharge of 0.052 mgd of treated wastewater as well as two discharges of untreated wastewater from Building #2. One of these discharges was 0.0003 mgd and the other was 0.00007 mgd. PADEP forwarded the application form, modular report, and plans for application #4682201 for the construction of an industrial waste treatment plant to discharge treated waste into an unnamed tributary of Park Creek to the Delaware River Basin Commission for review. (June 21, 1982) No comments were found in PADEP or USEPA files.

According to SSS there was no solid waste generated at the wastewater treatment plant. The concentrated acid was collected in two 2,000-gallon tanks. The liquid waste was truck hauled by Waste Conversion, Resources Technology, or equal. The primary discharge only required pH adjustment. A secondary stream of 300 gallons per day was pumped through a limestone column to reduce the fluoride waste to CaF_2. There was no sludge from the process. (June 29, 1982)

Effective March 4, 1983 the discharge of treated process waste from the wastewater treatment plant at Building #2 was temporarily discontinued. (March 25, 1983) An inspection was conducted on July 14, 1983. During this inspection discharge samples were collected. It is unclear which discharges were sampled. The presence of metals was identified in the samples collected. It was noted that this condition must be investigated. There was no indication in PADEP or USEPA files that an investigation was conducted. (August 30, 1983)

The wastewater treatment plant was located on the Building #2 property. A closure plan for the SSS facility was submitted in December 1984. Closure activities for the wastewater treatment plant included flushing the piping and tanks and removal and disposal of the rinse water.

In early 1985 the discharges from Building #2 were discontinued. On February 23, 1985 Discharges 200 and 400 were shutdown. Discharge 300 from Building #3 was the only remaining discharge. A sample collected in early 1985 from Discharge 300 was analyzed for priority pollutants. The only detectable constituents were arsenic (0.003 mg/L), phenols (0.012 mg/L), and zinc (0.04 mg/L). (January 22, 1985 and March 4, 1985) It is unclear if and when the discharge from Building #3 was discontinued. No discharges to the pond or unnamed tributary of Park Creek were located during the site visit.

Storch Engineers (Storch) oversaw the closure of the wastewater treatment plant in May 1985. According to the first field report, Storch was at the facility in part to oversee the decontamination of the cascading tanks in the wastewater treatment plant. Eldridge, Inc was present to clean the cascading tanks. A water jet was used to wash out the tanks and the washwater was pumped into a vacuum truck. The walls and floor of the cascading tanks were squeeged during the vacuuming to minimize the amount of liquid remaining in the tanks. According to the summary report prepared by Storch, samples collected in the wastewater treatment plant area were analyzed for pH. No elevated levels were detected. It was Storch's conclusion that closure activities of the wastewater treatment plant were complete. (May 21, 1985 and September 12, 1985) A PADEP inspection of the closed facilities was conducted on September 19, 1985. It was determined that closure was in accordance with the approved plan and PADEP approved the closure of the Montgomeryville plant. (September 26, 1985)

No documentation was found indicating that a release has occurred relating to the wastewater treatment plant. Picture 1 shows the wastewater treatment plant. Pictures 2 and 3 show the pond. Picture 4 shows the pond overflow. Picture 5 shows the driveway that the pond overflow crosses before entering the creek.

Building #1

The manufacturing operations in Building #1 were manual batch operations. Hydrofluoric, sulfuric phosphoric, and nitric acids were used in Building #1 operations. The spent acids were transported to the underground neutralization tanks outside the building. After neutralization, the tanks flowed into a storm drain which emptied into a tributary of Park Creek. Contaminated rinse waters and reverse osmosis reject streams also flowed into these tanks. Spent trichloroethene, acetone, alcohols, xylene, and photo solvents were containerized and transported to a nearby chemical company for reuse. The current status of the neutralization tank is unknown. (April 1976)

A wastewater characterization study was conducted at Solid State Scientific on December 30 & 31, 1975. Sample points 005 (storm drain downstream of Building #1) and 006 (storm drain upstream from Building #1) were collected. Wastes from Building #1 were characterized as having a high concentration of fluoride.

According to the December 1984 Closure Plan, there were no manufacturing operations at Building #1. This building was listed as being used for administrative offices. No closure activities were proposed for this building. It is unclear if this property was once used for manufacturing, as stated in the 1976 wastewater characterization study or only for non-manufacturing purposes. The current owners stated that a Phase I Assessment has been conducted for the property. A copy of this Phase I Assessment was requested but has yet to be provided.

According to a June 11, 1979 letter Building #1 was sold in 1979 to an unknown owner. At the time of the 1989 preliminary assessment, the building was operated by the Lactona Company. Mid-Lands Chemical Company is the current operator of the Building #1 property. Mid-Lands is involved in the manufacturing of chemical cold packs for food and pharmaceutical shipment.

Picture 6 shows this building as it appeared during the site visit. No documentation was found indicating that a release or remediation has occurred relating to this building.

Empty Drum Storage Area (SWMU #3)

A preliminary assessment was conducted at the former SSS Montgomeryville facility in 1989. This assessment identified only one SWMU associated with the Building #1 property. According to this report the empty drum storage area was maintained by SSS in the southeastern corner of the Building #1 property. Drums were cleaned and stored in this area prior to removal. No hazardous wastes were associated with this area. (October 17, 1989) No documentation was found indicating that a release, sampling, or remediation has occurred relating to this drum storage area.

Building #2

The manufacturing operations in Building #2 were similar to those of Building #1. One process used hydrofluoric acid and another used a sulfuric acid/hydrogen peroxide solution. Both of these processes were automated. Spent hydrofluoric acid from Building #2 was combined with contaminated rinse streams. The combined stream effluent was neutralized prior to discharge. The sulfuric acid discharge was diluted with other rinses and discharged to the stream. As of April 5, 1976 the stream was rerouted through a temporary sodium carbonate neutralization tank.

A wastewater characterization study was conducted at the SSS facility on December 30 & 31, 1975. Sample points 002 (Building #2 rinse stream and hydrofluoric waste) and 003 (Building #2 diluted waste from automated processes) were collected. Sample point 002 was characterized by extremely high fluoride concentrations and low pH. This condition indicated that the marble chip neutralization tank was ineffective in treating this discharge. Phenol concentrations as high as 14 mg/L were found in certain grab samples from this discharge. The neutralization tank was modified and other procedures were implemented to rectify the situation. Sample point 003 was characterized by extremely high sulfate and a very low pH. SSS installed a temporary neutralization system to control the pH of the waste stream prior to discharge. (April 1976)

According to the 1979 NPDES permit application, waste from Building #2, consisting of dilute hydrofluoric acid, dilute phenol, dilute sulfuric acid and hydrogen peroxide, was treated in the treatment plant. (July 9, 1979)

According to an August 18, 1981 letter, the following tanks or containment structures were located in the Building #2 area:

Location	Tank or Containment Size	EPA Hazard Waste #
Building #2	500 gallon In-ground Tank	D001
Building #2	750 gallon In-ground Acid Neutralization Tank	D002
Building #2	1,200 square foot drum storage area	D001, D002, F001, D999

Attached to a November 5, 1981 letter was the following list of wastes generated in Building #2, their storage facility, and their disposal procedures.

Tank	Chemical	Spill Containment	Disposal Frequency	Safety Precaution	Location
2,000 gallon Polyethylene	<10% H_2SO_4	6,000 gallon reinforced concrete	60 days	Alarm and Sump Pump	Building #2 WWTP
2,000 gallon Polyethylene	<5% HF	6,000 gallon reinforced concrete	60 days	Alarm and Sump Pump	Building #2 WWTP
550 gallon steel	Mixed Solvent	________	18 days	Daily Visual Check and Volume Check	Building #2 Buried in ground on Enterprise Drive Side of Building
(110) 55 gallon drums (20) 5 gallon cans	Waste Oil Sulfonic Acid Chromic Sulfuric Acid Mixed Solvents	1,000 gallon bermed asphalt (34' by 40')	90 days	Daily Visual Check	Building #2 Parking Lot

A floor plan of Building #2 was provided in the 1981 PPC Plan. There was an Area "A" labeled as containing 140 gallons of acid, 40 gallons of solvent, and 90 gallons of caustic. An Area "B" contained 500 pounds of caustic. Twelve cylinders of bottled gas were contained in Area "C". None of these areas currently exist as the interior of the building was renovated upon sale to the current owner. (December 1981)

According to the December 1984 Closure Plan, Building #2 contained manufacturing facilities, waste chemical storage areas, and the wastewater treatment plant. Closure activities planned for Building #2 included the removal and disposal of all chemicals and contaminated piping. The area was to be cleaned and any areas of chemical residue were to be removed. Separate closure activities were planned for the waste chemical storage areas and the wastewater treatment plant.

Solid State Scientific has completed closure of the Building #2 location in Montgomeryville as a generator. The treatment and storage facilities were closed in 1985. The closure certificate of Building #2 was issued on June 13, 1986. SSS vacated the facility in 1986 and the property associated with Building #2 was sold to HVDC at some point during 1987. (October 17, 1989)

In 1987 a groundwater sampling event was initiated to evaluate potential adverse environmental impacts to groundwater from past practices at Building #2. On March 17, 1987 groundwater samples were collected from monitoring wells MW-2 through MW-5 and analyzed for priority pollutant volatile organic compounds and priority pollutant metals. It is unclear if a MW-1 exists at the site as no results were provided. Results of this sampling event were as follows:

	MW-2	MW-3	MW-4	MW-5
Benzene (µg/L)	---	---	---	---
Bromodichloromethane (µg/L)	---	---	---	---
Bromoform (µg/L)	---	---	---	---
Bromomethane (µg/L)	---	---	---	---
Carbon tetrachloride (µg/L)	---	<1.0	<1.0	<1.0
Chlorobenzene (µg/L)	---	---	---	---
Chloroethane (µg/L)	---	---	---	---
2-Chloroethyl vinyl ether (µg/L)	---	---	---	---
Chloroform (µg/L)	---	<1.0	1.0	---
Chloromethane (µg/L)	---	---	---	---
Dibromochloromethane (µg/L)	---	---	---	---
1,2-Dichlorobenzene (µg/L)	---	---	---	---
1,3-Dichlorobenzene (µg/L)	---	---	---	---
1,4-Dichlorobenzene (µg/L)	---	---	---	---
1,1-Dichloroethane (µg/L)	3.3	2.7	<1.0	---
1,2-Dichloroethane (µg/L)	---	26.8	---	---
1,1-Dichloroethene (µg/L)	---	2.9	---	---
Trans-1,2-Dichloroethene (µg/L)	1.9	1,075	2	2.7
1,2-Dichloropropane (µg/L)	---	---	---	---
Cis-1,3-Dichloropropene (µg/L)	---	---	---	---
Trans-1,3-Dichloropropene (µg/L)	---	---	---	---
Ethylbenzene (µg/L)	---	19.5	---	---
Methylene Chloride (µg/L)	---	---	---	---
1,1,2,2-Tetrachloroethane (µg/L)	---	---	---	---
Tetrachloroethene (µg/L)	---	3.6	---	---
Toluene (µg/L)	---	3.8	---	---
1,1,1-Trichloroethane (µg/L)	<1.0	7.1	6.6	16.1
1,1,2-Trichloroethane (µg/L)	---	---	---	---
Trichloroethene (µg/L)	2.2	636.4	3.2	21.6
Vinyl Chloride (µg/L)	---	82.6	---	---
Antimony (mg/L)	<0.05	<0.05	<0.05	<0.05
Arsenic (mg/L)	<0.0005	0.001	<0.0005	<0.0005
Beryllium (mg/L)	<0.05	<0.05	<0.05	<0.05
Cadmium (mg/L)	0.006	<0.002	<0.002	0.004
Chromium (mg/L)	<0.01	<0.01	<0.01	<0.01
Copper (mg/L)	0.01	<0.01	<0.01	<0.01
Lead (mg/L)	0.01	<0.01	<0.01	<0.01

	MW-2	MW-3	MW-4	MW-5
Mercury (mg/L)	<0.0005	<0.0005	<0.0005	<0.0005
Nickel (mg/L)	<0.01	<0.01	<0.01	<0.01
Selenium (mg/L)	<0.0005	<0.0005	<0.0005	<0.0005
Silver (mg/L)	<0.01	<0.01	<0.01	<0.01
Thallium (mg/L)	<0.01	<0.01	<0.01	<0.01
Zinc (mg/L)	<0.01	<0.01	<0.01	<0.01

As a result of the high levels of constituents found in MW-3, a study was performed to evaluate the areal and vertical extent of contaminated soil in the vicinity of this monitoring well. Twenty borings were advanced to refusal, which ranged from 1' to 8.3'. Five soil samples, one from each of B-2, B-7, B-8, B-16, and B-17 were sent to Century Labs for VOC analysis. B-2 was located within the outline of the waste solvent tank area. There was no report of odor at this location. B-7 and B-8 were located in a grassy area to the northwest of the waste solvent tank area. B-16 was located in a grassy area west of MW-3. There was a strong solvent odor at 2.5'-4' with a Hnu reading of 400. B17 was located in a grassy area to the south of B-16. (May 26, 1987 and June 3, 1987) The results of this study are presented in the following table.

Boring	Sample #	Composite Sample Depth	VOCs Detected	Concentration (µg/kg)
B-2	B2-3	4.5-6.5 feet	Trans-1,2-Dichloroethane	430
			Toluene	70 J
			Ethylbenzene	760 J
			1,2-Dichlorobenzene	420 J
B-7	B7-1	0.5-2.5 feet	Toluene	1 J
			Tetrachloroethene	21
			Ethylbenzene	1 J
B-8	B8-1	0.5-2.5 feet	Trans-1,2-Dichloroethane	10,000
			Toluene	1,350 J
			Ethylbenzene	33,000
			1,2-Dichlorobenzene	860 J
B-16	B16-2	2.5-4.0 feet	Toluene	60 J
			Trichloroethene	1,400
			Ethylbenzene	1,600
B-17	B17-1	0.5-2.5 feet	Trans-1,2-Dichloroethane	210
			Toluene	7
			Trichloroethene	1,200
			Tetrachloroethene	17
			Ethylbenzene	384
			1,2-Dichlorobenzene	47

J indicates estimated values

Groundwater samples were also collected from Borings 8 and 17. The results are presented in the following table. (April 8, 1987).

Boring	Sample #	Composite Sample Depth	VOCs Detected	Concentration (µg/L)
B-8	B8-1	0.5-2.5 feet	Trans-1,2-Dichloroethane	210
			Trichloroethene	1,200
			Tetrachloroethene	17
			Ethylbenzene	384
			1,2-Dichlorobenzene	47
B-17	B17-1	0.5-2.5 feet	Trans-1,2-Dichloroethane	10,000
			Toluene	1,500 J
			Ethylbenzene	33,000
			1,2-Dichlorobenzene	860 J

The study concluded that an area consisting of approximately 800 ft^2 was contaminated with VOCs at concentrations greater than 1 part per million (ppm). Most of the borings within this contaminated area showed the highest PID readings at refusal. An orange liquid was also observed in B-9 and B-17. During the 1987 investigation large goldfish were observed swimming in the pond and stream. A slight sheen was observed downstream of a pipe protruding from the stream bank. Liquid was observed to be dripping from this pipe. There was no indication that the dripping liquid was sampled as part of this investigation. The recommendation of this investigation was to excavate approximately 180 cubic yards of VOC contaminated soil. (June 3, 1987)

PADEP approved the removal of soil from areas around MW-3. (November 2, 1987) On September 15, 1987 HVDC requested an EPA ID# so that they may remove approximately 250 tons of contaminated soil on their recently purchased property. HVDC is not a generation or treat/store/dispose facility and only requested the ID# for one time use. A PADEP Memo from January 21, 1988 indicated that the facility was excavating a 30' by 30' by 4' deep hole to bedrock. The extent of excavation was limited by the stream and building foundations. The soil removal was completed during January 1988. (October 17, 1989)

Building #2 was leased to EMCA, a manufacturer of thick film pastes, on May 16, 1988. EMCA was a small quantity generator with no more than two 55-gallon drums of hazardous waste generated during a 90-day disposal period. This waste consisted of one drum of F003 spent solvent waste and one drum of characteristic D008 product waste. The wastes were removed off-site by Rollins. Three monitoring wells were installed in 1988 by EMCA for in-house monitoring purposes. EMCA was not involved in any public agency monitoring programs and therefore does not submit results to PADEP. (October 17, 1989) Groundwater monitoring results were requested from Ferro but have not yet been provided. Although Ferro continues to lease the property, Building #2 has since been vacated. Review of documents indicate the potential for up to eight monitoring wells at the site. It is unclear how many wells currently exist and how many are regularly sampled. Picture 7 shows the entrance to Building #2 and Picture 8 shows the rear of the building. Pictures 9 through 13 show process equipment located in Building #2. Picture 14 shows a monitoring well located on the Building #2 property.

Waste Chemical Storage Areas
Building #2 contained waste chemical storage areas. A closure plan for the SSS facility was submitted in December 1984. All waste chemicals in the storage area were to be removed and disposed off-site. The minimum amount of waste chemicals was estimated as 15 drums of acid waste, 30 empty waste chemical drums, 5 drums of solvent waste, and 25 drums of miscellaneous chemical waste. The storage area was to be cleaned and any areas of chemical residue were to be removed. No documentation was found indicating that a release or sampling has occurred relating to the waste chemical storage areas.

Acid Treatment Tank (SWMU #1)
A preliminary assessment was conducted at the former SSS Montgomeryville facility in 1989. This assessment identified several SWMUs associated with the Building #2 property. One of these SWMUs was the acid treatment tank that had been used for the treatment of plant wastewaters including electroplating wastes. Electroplating wastes included U002, U072, U134, U154, U188, U229, and U239 wastes. The process code for this unit was T01 at a design capacity of 85,000 gallons per day. It was believed that this underground storage tank was used in conjunction with the waste treatment plant. The tank was located approximately 100 feet west of the treatment plant. The tank was apparently removed before SSS halted operations at the site. There were no known containment structures associated with this unit. There are also no known releases. (October 17, 1989)

Underground Waste Solvent Tank (SWMU #2)
A preliminary assessment was conducted at the former SSS Montgomeryville facility in 1989. This assessment identified several SWMUs associated with the Building #2 property. One of these SWMUs was the underground waste solvent tank, located on the southern portion of the Building #2 property. The tank was located approximately 25 feet west of the acid treatment tank. This SWMU was a 550-gallon steel tank used by SSS for the storage of waste solvents prior to disposal off-site. The waste solvents were generated from electroplating operations and transferred to the tank via piping from Building #2. (October 17, 1989)

A closure plan for the SSS facility was submitted in December 1984. Closure activities for the waste chemical storage areas included the removal and disposal of the waste solvent tank and access piping.

Storch oversaw the closure of the underground waste solvent tank in May 1985. SSS indicated that 100 gallons of TCE was added to the solvent storage tank to loosen sludge that was present. At the time Storch was on site the solvent storage tank pit contained 12 inches of water. Storch intended to collect one soil sample from beneath the gravel layer in the timber walled pit of the solvent storage tank following the removal of the tank and pumping the pit dry. The water pumped from the pit was discharged directly to the creek. Storch observed an oily sheen present on the water and inquired about the nature of the water being discharged. It was stated that PADEP regularly took samples from the water and never cited the facility for any violations. It was assumed that the black, oily texture of the water in the pit was caused by creosote leaching from the timber railroad tie walls of the pit. The attempt to sample the pit was futile since the gravel area was difficult to pump dry. An area of gravel was excavated but groundwater and digging difficulty prevented accessibility to the underlying soil. (May 21, 1985)

Storch was present for the removal of the waste solvent tank and piping on May 22, 1985. Due to equipment problems the tank was not removed. Storch was again present on the 23rd and was finally able to sample the waste solvent storage tank pit. (May 22, 1985 and May 23, 1985)

According to the summary report prepared by Storch, samples collected in the waste solvent tank pit were analyzed for VOCs. No elevated levels were detected. It was Storch's conclusion that closure activities of the underground waste solvent tank were complete. (September 12, 1985) A PADEP inspection of the closed facilities was conducted on September 19, 1985. It was determined that closure was in accordance with the approved plan and PADEP approved the closure of the Montgomeryville plant. (September 26, 1985)

Four monitoring wells were installed around Building #2. Sampling of these wells in 1987 revealed VOC contamination in MW-3. The source of the contamination was believed to be the waste solvent tank. This tank had been removed prior to this sampling event and additional soil was removed from around this well. (November 2, 1987) Picture 15 shows the location of the underground waste solvent tank.

Drum Storage Shed (SWMU #4)

A preliminary assessment was conducted at the former SSS Montgomeryville facility in 1989. This assessment identified several SWMUs associated with the Building #2 property. One of these SWMUs was the drum storage shed located on the western side of the Building #2 parking area. This area is approximately 42 feet by 36 feet with a 10 foot high fence with a locked gate. SSS constructed this SWMU which was modified by the current operator of the property. The modifications made by EMCA included the addition of a detached roof and the construction of a smaller elevated concrete pad with a 4-inch curb within the existing shed. (October 17, 1989) Picture 16 shows the drum storage shed as it appeared during the site visit.

Storch oversaw the closure of drum storage shed in May 1985. The drums in the drum storage area contained 97.5% sulfuric acid and weaker concentration of other acids and various other compounds. Eldridge, Inc. was present to empty the drums in this area. The remaining liquid in the 43 drums present in the area was pumped out to the vacuum truck. The fiberglass tank in the area was washed with the water jet and washwater was also pumped to the vacuum truck. Storch intended to collect one soil sample from the drum storage shed following the removal of bituminous pavement and the pavement subgrade soil. (May 21, 1985)

Storch was back on site for the excavation of the bituminous pavement and soil subgrade in the drum storage area on May 23, 1985. Two feet of pavement and 12 to 16 inches of soil were removed from the drum storage area. Excavation was done in the southerly quadrant of the area since the area slopes in that direction. There was some dark staining present on the pavement on the easterly side of the excavated area. Storch was able to collect a sample from the underlying soil in the drum storage area.

According to the summary report prepared by Storch, chromium was detected at a level of 47 ppm in the drum storage shed sample, which was analyzed for EP toxicity. The allowable EP toxicity limit for chromium is 5 ppm. It was Storch's conclusion that with the completion of the excavation of 12 inches of soil deemed for removal in the drum storage shed, closure activities of the drum storage shed were complete. (September 12, 1985) A PADEP inspection of the closed facilities was conducted on September 19, 1985. It was determined that closure was in accordance with the approved plan and PADEP approved the closure of the Montgomeryville plant. (September 26, 1985) No documentation was found indicating that a release has occurred relating to this drum storage shed.

Empty Drum Storage Area (SWMU #5)
A preliminary assessment was conducted at the former SSS Montgomeryville facility in 1989. This assessment identified several SWMUs associated with the Building #2 property. One of the SWMUs identified was the empty drum storage area. It is not known or believed that this SWMU was used by SSS. The empty drum storage area is located along the western façade of the EMCA building. The unit consists of a 5 foot by 5 foot concrete pad fenced on the two open sides and used for the storage of empty 55-gallon drums. No hazardous waste is associated with this unit. (October 17, 1989) No documentation was found indicating that a release, sampling, or remediation has occurred relating to this empty drum storage area.

Aboveground Waste Storage Tanks (SWMU #6)
A preliminary assessment was conducted at the former SSS Montgomeryville facility in 1989. This assessment identified several SWMUs associated with the Building #2 property. One of the SWMUs identified was the aboveground waste storage tanks, located partially in the ground in the former SSS treatment building. This SWMU was not used by SSS as the tanks and piping system were put in place with the start of EMCA operations at the property. Each EMCA production department used a sump to collect aqueous and powder wastes. These wastes were transported via an aboveground piping system to the two 2,300 gallon waste storage tanks. (October 17, 1989) No documentation was found indicating that a release, sampling, or remediation has occurred relating to these tanks.

Transformers
Although no documentation was found in PADEP or USEPA files pertaining to transformers at the site, several were noted in and around Building #2 during the site visit. It is unclear if these transformers were present during SSS operations or were installed during EMCA operations. Transformers were present in the drying room and the furnace room. Several transformers were located outside the rear of the building and along the side of the building fronting Enterprise Road. It is unclear if these transformers contained or have been tested for polychlorinated biphenyls (PCBs). All transformers appeared to be in good condition with no leaks. Pictures 17 through 22 show these transformers. No documentation was found indicating that a release, sampling, or remediation has occurred relating to these transformers.

Building #3
The batch operations in Building #3 used perchloric and hydrochloric acids and a number of photo chemicals. Contaminated acids and photo chemicals were containerized and stored for off-site disposal. Water rinses used to remove residue from photo masks were piped to an underground holding tank at the rear of the building. This tank was pumped by an outside contractor for disposal. A wastewater characterization study was conducted at Solid State Scientific on December 30 & 31, 1975. Sample point 004 (Building #3 waste storage tank) was

collected. The holding tank at the rear of Building #3 was periodically emptied and the contents disposed of off-site. This waste stream had high levels of dissolved solids, BOD, and COD. These values indicated that high strength organics from photo chemicals were entering this stream. (April 1976)

According to the 1979 NPDES permit application, waste from Building #3 consisting of dilute photo resist chemicals flowed to the anaerobic treatment system, then to a sump, and then to the treatment plant. The two streams were collected in a common sump of 15,000-gallon capacity for equalization and treatment.

According to an August 18, 1981 letter, the following tank was located in the Building #3 area:

Location	Tank or Containment Size	EPA Hazard Waste #
Building #3	1,000 gallon In-ground Tank	D002

Attached to a November 5, 1981 letter was the following list of wastes generated in building #2, their storage facility, and their disposal procedures.

Tank	Chemical	Spill Containment	Disposal Frequency	Safety Precaution	Location
1,000 gallon steel	Solvents with Water	________	20 days	Daily Visual Check and Volume Check	Building #3 Buried in ground in back

A floor plan of Building #3 was provided in the 1981 PPC (PPC) Plan. There was an Area "1" labeled as containing 3,800 gallons of solvent. An Area "2" contained 3,000 gallons of acid. Twelve cylinders of bottled gas were contained in Area "3". None of these areas currently exist as the interior of the building was renovated upon sale to the current owner. (December 1981)

According to the December 1984 Closure Plan, Building #3 contained manufacturing facilities. Closure activities planned for Building #3 included the removal and disposal of all chemicals and contaminated piping. The area was to be cleaned and any areas of chemical residue were to be removed.

Moyco purchased the Building #3 property with financial assistance from the Montgomery County Industrial Corporation. Moyco stated that although they were unsure what SSS had used the building for, the building contained mostly computer equipment when they purchased the property. In 1996 Moyco expanded the manufacturing facility to approximately double the size of the former SSS Building #3. Moyco stated that Phase I Assessments were conducted by the lending institution in the late 1980s and by Moyco at the time of the expansion. The Moyco Phase I Assessment included core sampling in the area of the expansion. Copies of these Phase I Assessments were requested but have yet to be provided.

Moyco is a manufacturer of precision-coated abrasives. The company produces fine grade sandpaper, which is similar to magnetic tape. Products manufactured by Moyco range from extremely fine abrasives used for polishing in the electronic industry to abrasives used for emery boards. Abrasives utilized in coating include silicon carbide, aluminum oxide, and diamond. No documentation was found indicating that a release, sampling, or remediation has occurred relating to this building.

Acid Storage Tanks

A site map included with the 1981 PPC Plan showed two 1,000 gallon underground storage tanks used for acid and a 1,000 gallon underground storage tank for the storage of solvents with water. (December 1981)

Storch oversaw the decontamination of the two 1,000 gallon fiberglass tanks in May 1985. Samples from the two tanks were taken by Storch. A paper towel was used to swab liquid for sample SSS-1. The absorbed liquid was then squeezed into the sample bottle. There was no mention of the results of this sample or the analyses that was performed. (May 21, 1985)

A representative of Moyco was unaware of underground storage tanks on their property. The two acid storage tanks were located during the site visit and were found to be filled with dirt and standing water. The Moyco representative admitted that the soil was placed in the tanks during the excavation for the installation of the thermal oxidizer. There was a sheen present on the standing water in one of the tanks. No samples were collected by PADEP. However, the facility indicated that they would take a sample for their record. Although the results of the analysis were not provided for this report, Moyco indicated in a subsequent conversation that both the soil and water samples collected from this tank were clean. Pictures 23 through 26 show these tanks and their contents. No documentation was found indicating that a release, sampling, or remediation has occurred relating to these tanks.

Air Emissions and Underground Storage Tank

Moyco utilizes a thermal oxidizer to maintain compliance with VOC emissions. The thermal oxidizer destroys 98% of the solvents used in coating operations. The thermal oxidizer is located in the rear of the facility near the reported location of a SSS underground storage tank for the storage of solvents with water. This tank could not be located during the site visit. The Moyco representative indicated that soils were excavated and backfilled during the April 1994 installation of the oxidizer and the tank was not discovered during excavation activities. No documentation was found to indicate that SSS removed the tank prior to sale of the property.

Moyco utilizes both solvent and water based coatings, which are applied by a surface roll coater. An Operating Permit #46-318-023 was issued on December 19, 1991 for the operation of the coater and drying oven. This permit expired on December 31, 1992. An additional Operating Permit #46-318-022 was issued on January 22, 1992 for the operation of the coater and drying oven. This permit expired on January 31, 1993. Moyco indicated that these permits were later rolled into one permit. Picture 27 shows the coater.

Currently Moyco maintains Operating Permit #46-318-038 for the operation of the Thermal Oxidizer. This permit was last issued on December 5, 1997 with an expiration date of December 5, 2002. Picture 28 shows the thermal oxidizer.

PADEP and USEPA files were reviewed pertaining to SSS and not Moyco. It is unknown if any release, sampling, or remediation has occurred relating to the thermal oxidizer or the coater and drying oven.

Solvent Storage Area

Moyco maintains a diked room for solvent storage. There are no drains located in this room. Safety features for this room included electrical grounding and special blow out panels in the event of an explosion. Pictures 29 and 30 show the solvent storage area. PADEP and USEPA files were reviewed pertaining to SSS and not Moyco. It is unknown if any release, sampling, or remediation has occurred relating to the solvent storage area.

Solvent Cleaning Area

Moyco maintains a small room off the printing ink area and near the solvent storage area for cleaning of buckets and other small equipment used to handle solvents. There are no drains located in this room. Picture 31 shows the solvent cleaning area. PADEP and USEPA files were reviewed pertaining to SSS and not Moyco. It is unknown if any release, sampling, or remediation has occurred relating to the solvent cleaning area.

Printing Area Sink

Although the facility once utilized a septic tank system for wastewater discharge, the facility is currently connected to public water. According to the Moyco representative the septic system was removed when the public water connection was made. There are only two drains in the manufacturing areas of the plant, which connect to the public sanitary sewer system. One drain is located in the printing area. No solvents are utilized in this area. Picture 32 shows the laboratory sink. PADEP and USEPA files were reviewed pertaining to SSS and not Moyco. It is unknown if any release, sampling, or remediation has occurred relating to the printing area sink.

Laboratory Sink

Although the facility once utilized a septic tank system for wastewater discharge, the facility is currently connected to public water. According to the Moyco representative the septic system was removed when the public water connection was made. There are only two drains in the manufacturing areas of the plant, which connect to the public sanitary sewer system. One drain is located in a laboratory. Water slurry from polishing enters this drain. No solvents are utilized in this area. Only water and abrasives could enter this drain. Picture 33 shows the laboratory sink. PADEP and USEPA files were reviewed pertaining to SSS and not Moyco. It is unknown if any release, sampling, or remediation has occurred relating to the laboratory sink.

Transformers

Although no documentation was found in PADEP or USEPA files pertaining to transformers at the site, transformers were noted in the rear of Building #3 during the site visit. A representative of Moyco indicated that the transformers were present at the time the property was purchased from SSS. It is unclear if these transformers contained or have been tested for polychlorinated biphenyls (PCBs). All transformers appeared to be in good condition with no leaks. Picture 34 shows these transformers. No documentation was found indicating that a release, sampling, or remediation has occurred relating to these transformers.

C. Description of Exposure Pathways for all Releases or Potential Releases

Air: The area included in the 1989 NUS study area for this facility included approximately 57,495 people within 3 miles of the site with 437 people living within a 1-mile radius of the site, and 5,280 people living within a 2-mile radius of the site.

Groundwater: Shallow groundwater migration is expected to be to the southeast, toward the unnamed tributary of Park Creek. The Lockatong Formation has a low permeability and a low porosity. The capacity of the Lockatong to store and transmit water is very low. Well yields range from 4 to 40 gallons per minute with an average yield of about 7 gpm.

Except for a few isolated homes, all of the residents in the 3-mile radius area are served by one of four public water distribution systems: the North Penn Water Authority (NPWA), the North Wales Water Authority (NWWA), the Horsham Township Authority (HTA), and the Warrington Township Municipal Authority (WTMA). The NPWA supplied water to approximately 55,000 people in Hatfield, Towamencin, Franconia, Lower Salford, Upper Gwynedd, Hilltown, Worcester, and Skippack Townships. No private domestic wells were identified within a 1-mile radius of the facility. The NPWA uses 55 groundwater wells, 14 of which are located within 3 miles of the site with the closest 1.9 miles to the northeast. Depths of the wells range from 500 to 667 feet and are cased between 43 and 97 feet. The NWWA supplies water to approximately 40,000 people in Upper Gwynedd, Whitpain, Upper Dublin, and Montgomery Townships. NWWA uses 28 groundwater wells, 5 of which are located within 3 miles of the site with the closest 2.4 miles to the north-northeast. The HTA has 4,800 connections serving approximately 16,300 people in Horsham Township. The HTA uses 14 groundwater wells, 2 of which are located within 3 miles of the site with the closest 2.5 miles to the southeast. The WTMA supplied water to approximately 10,700 people in Warrington Township. The WTMA uses 7 groundwater wells, which are all located outside the 3-mile radius.

Surface Water: Surface water runoff will enter the municipal sewer system via on-site drains or through street sewers. A small amount of heavy precipitation runoff might enter the on-site pond and creek. The pond, located in the southwestern corner of the building #2 lot empties into an unnamed tributary of Park Creek. SSS maintained a discharge to this stream. The stream flows for approximately 1,600 feet to convergence with the intermittent headwaters of Park Creek. Park Creek is listed as a warm-water fishery.

Soil: The facility is underlain by Made land soil. The soil is a result of altering and mixing soils formed in material weathered from shale and sandstone. Primarily this land type is nearly level and gently sloping and is likely to be found on low-lying flats. The soil is dusky-red to yellowish-brown shaly silt loam to channery sandy loam with some areas along the Schuylkill River consisting of gravelly silty clay loam mixed with shale. The soil has a moderate to very slow permeability, a moderate to very low available moisture capacity, and a pH range of very strong acid to medium acid.

D. Exposure Pathway Controls and/or Release Controls Instituted at the Facility

<u>**Air:**</u> Limited information was available concerning the Building #1 property. It is unknown what types of controls are instituted by Mid-Lands for controlling air emissions. Operations at Building #2 are currently shutdown with no air emissions. Air emissions at Building #3 are controlled through the use of a thermal oxidizer, which destroys 98% of VOCs utilized in Moyco processes.

<u>**Groundwater:**</u> No current groundwater monitoring results have been obtained at this point. It is unknown if monitoring wells exist on the Building #1 property. Ferro maintains four wells for in-house monitoring. Current results were requested and have not yet been provided. Moyco does not have monitoring wells on their property. Groundwater monitoring results from 1987 indicated VOC contamination in the area of MW-3. Soils in this area were excavated to remove the source of contamination but no post excavation groundwater results were found in PADEP or USEPA files. It is unclear if groundwater contamination is still present on the Building #2 property.

<u>**Surface Water:**</u> SSS maintained treated and untreated discharges to an unnamed tributary of Park Creek. According to the facility's CO&A, SSS had discharged wastes containing contaminant levels as high as: 525 mg/L of fluoride, 1,440 mg/L of dissolved solids, 1.5 mg/L of phenol, 0.68 mg/L of zinc, and 0.45 mg/L of hexavalent chromium since September 3, 1980. This discharge also had a pH as low as 1.8. It is unclear if the current property owners maintained discharges to this creek. An upstream and downstream surface water and sediment sample was collected in October 1987 and found trans-1,2-dichloroethane in surface water and trichloroethene contamination in both surface water and sediment. (October 13, 1987) During the site visit, there was no indication of discharges.

<u>**Soil:**</u> All manufacturing operations take place within the three buildings. The drum storage area and wastewater treatment plant on the Building #2 property and the thermal oxidizer on the Building #3 property are enclosed in fencing or a building and locked for access control. Access to other portions of these properties was not limited.

E. Follow-up Action Items

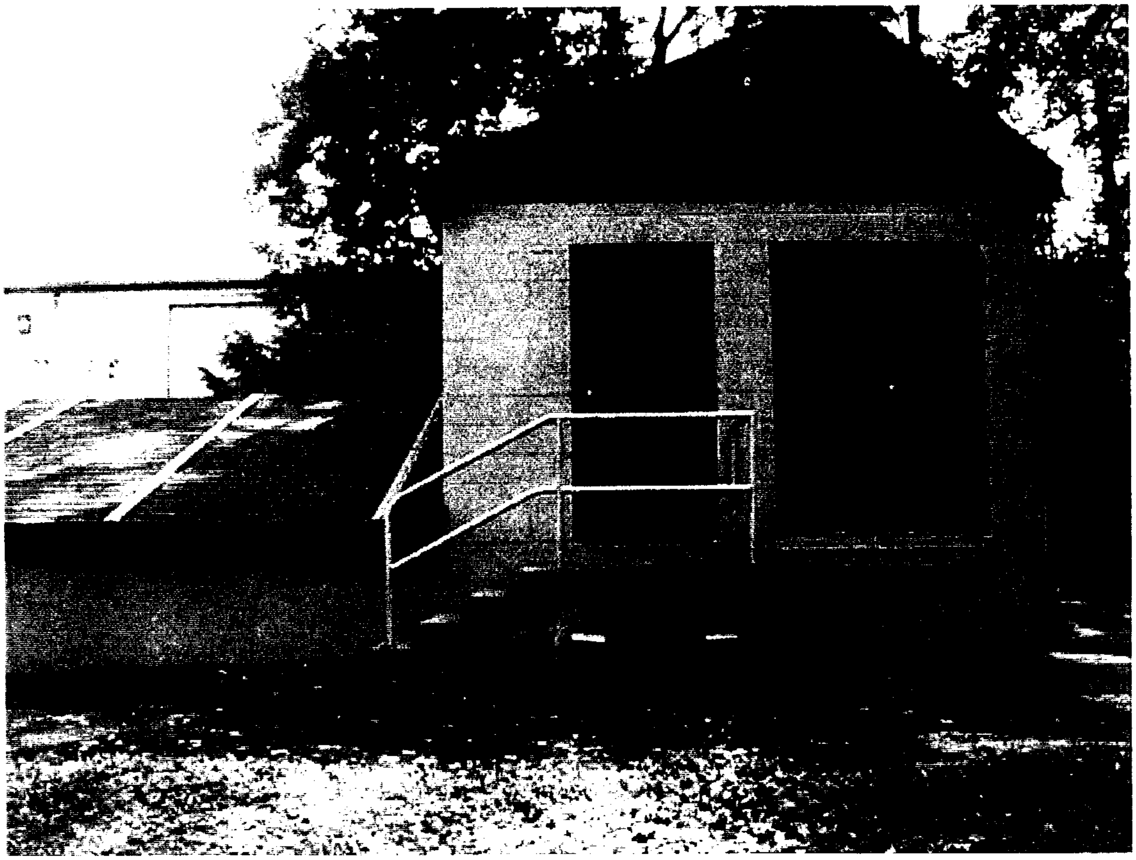
USEPA, Region III will decide if additional information or sampling at the facility is required to determine whether or not the environmental indicators have been met or if corrective action is required by the facility.

Phase I Assessments were performed on the Building #1 and Building #3 properties. Copies of these assessments were requested from Moyco and the private owners of Building #1. Neither property owner has provided the requested documentation at this time. Ferro monitors four wells on the Building #2 property and results were requested and have not yet been provided for this report.

SUMMARY OF RELEASES

Date of Release	Nature of Release	Document
March 1975	An underground storage tank ruptured. The remaining contents of the tank were pumped out and contaminated soil was excavated. The excavated soil was disposed of at a licensed landfill. It is the facility's contention that the matter was handled thoroughly and did not have a severe impact on the site. The facility installed a new 550-gallon skid mounted tank in an open pit. This allows for routine checks of the tanks integrity and quick replacement in the event of another release or rupture. According to an April 16th Letter the old tank and contaminated soil were removed on schedule and disposed of properly. The facility had completed everything suggested in PADEP's March 24th Letter with the exception of the permit, which was being worked on.	December 1981 Preparedness, Prevention, and Contingency Plan and April 16, 1975 Letter regarding Tank and Contaminated Soil

APPENDIX A
INSPECTION PHOTOGRAPHS
SOLID STATE SCIENTIFIC, INC.
MONTGOMERYVILLE, PA



Picture #1 - Wastewater treatment plant on former Building #2 property.

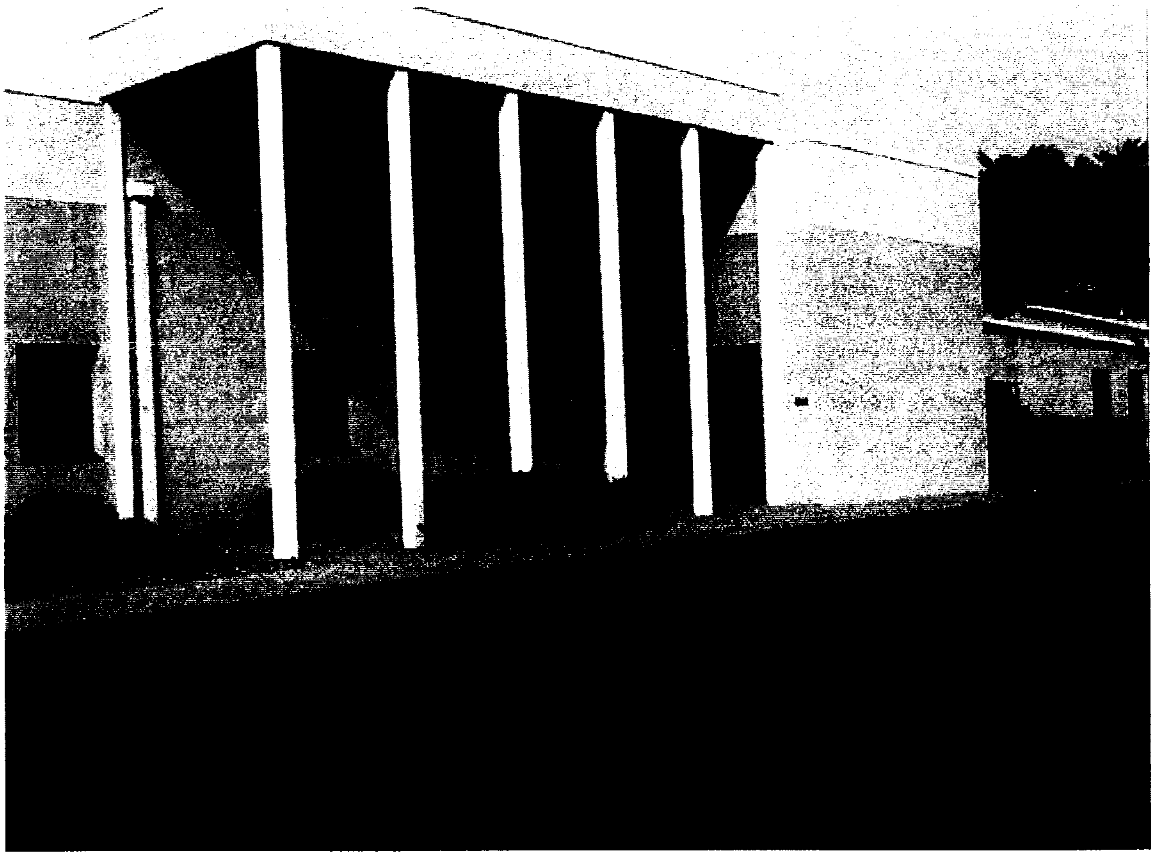
Picture #2 - Fish in the pond on the former Building #2 property.

Picture #3 - View overlooking pond on former Building #2 property.

Picture #4 - Pond overflow on former Building #2 property.

Picture #5 - View of driveway where the pond overflows to the creek on former Building #2 property

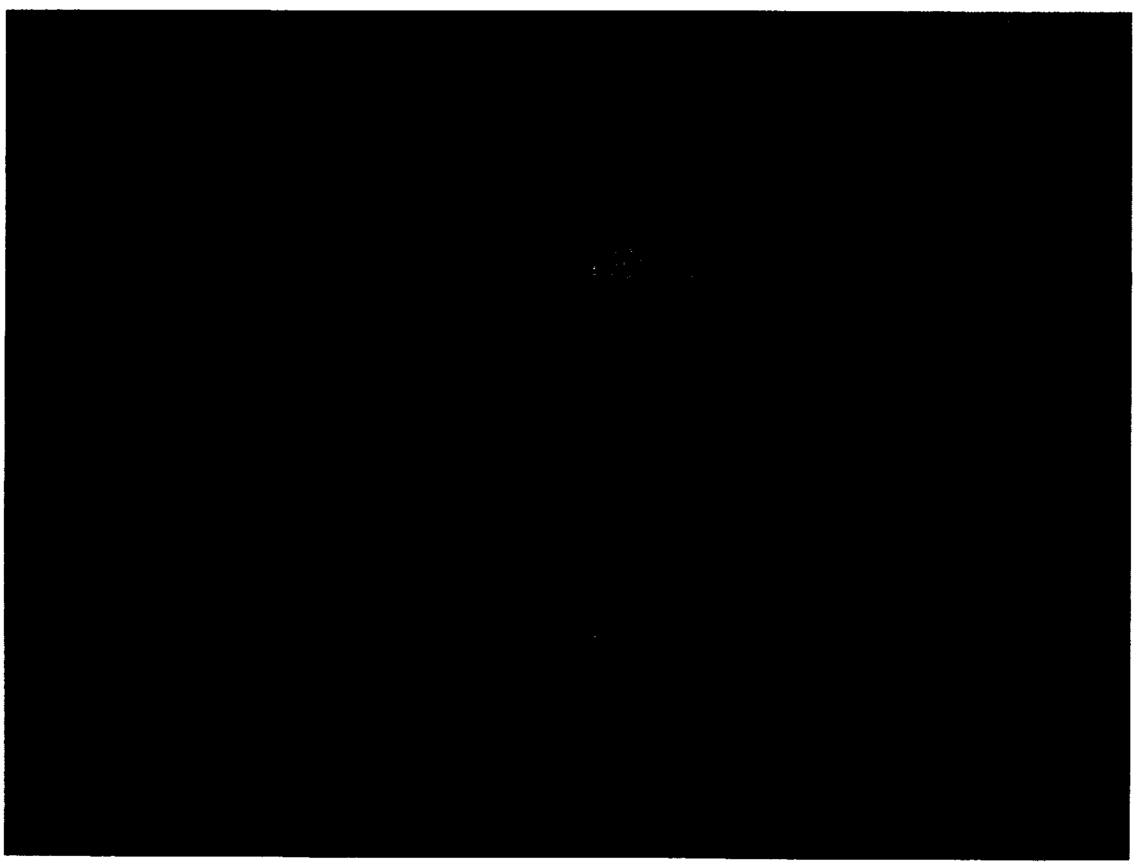
Picture #6 - Former Building #1 now Midlands Chemical Company



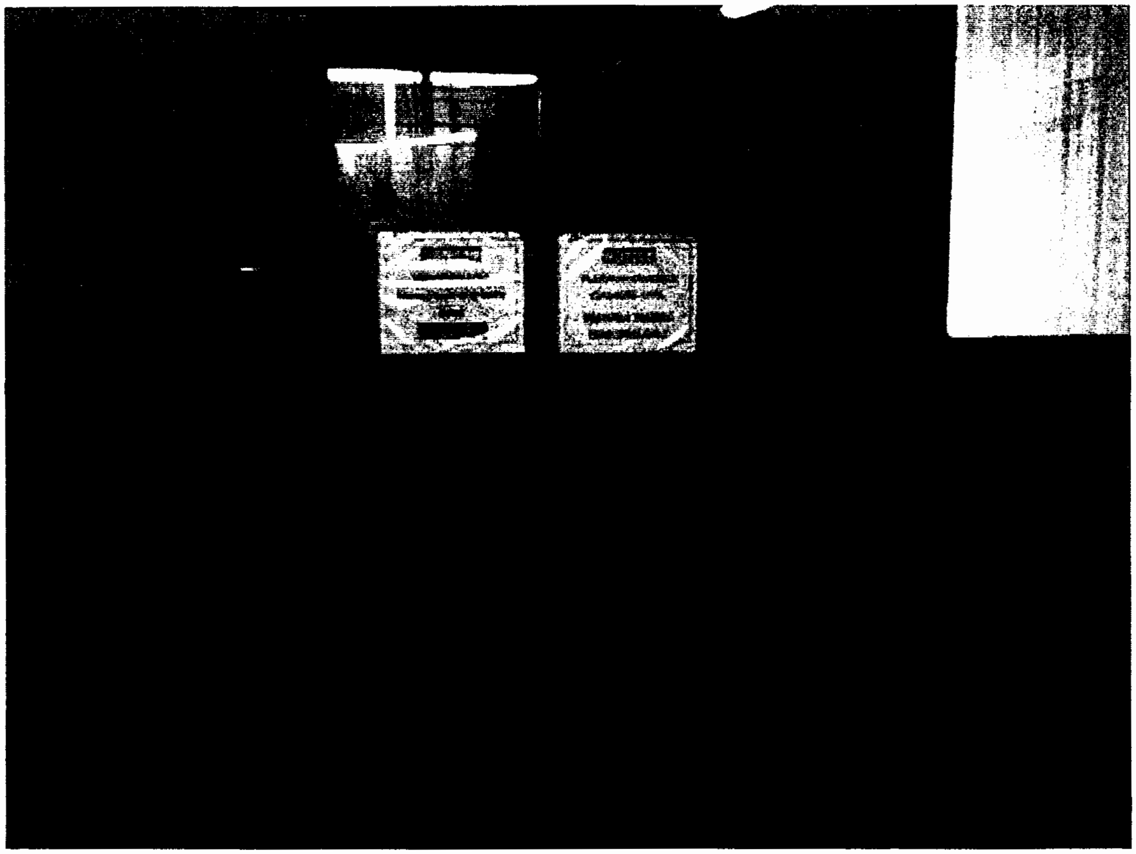
Picture #7 - Former Building #2 now leased by Ferro Electronic Materials - EMCA

Picture #8 - View of rear of former Building #2

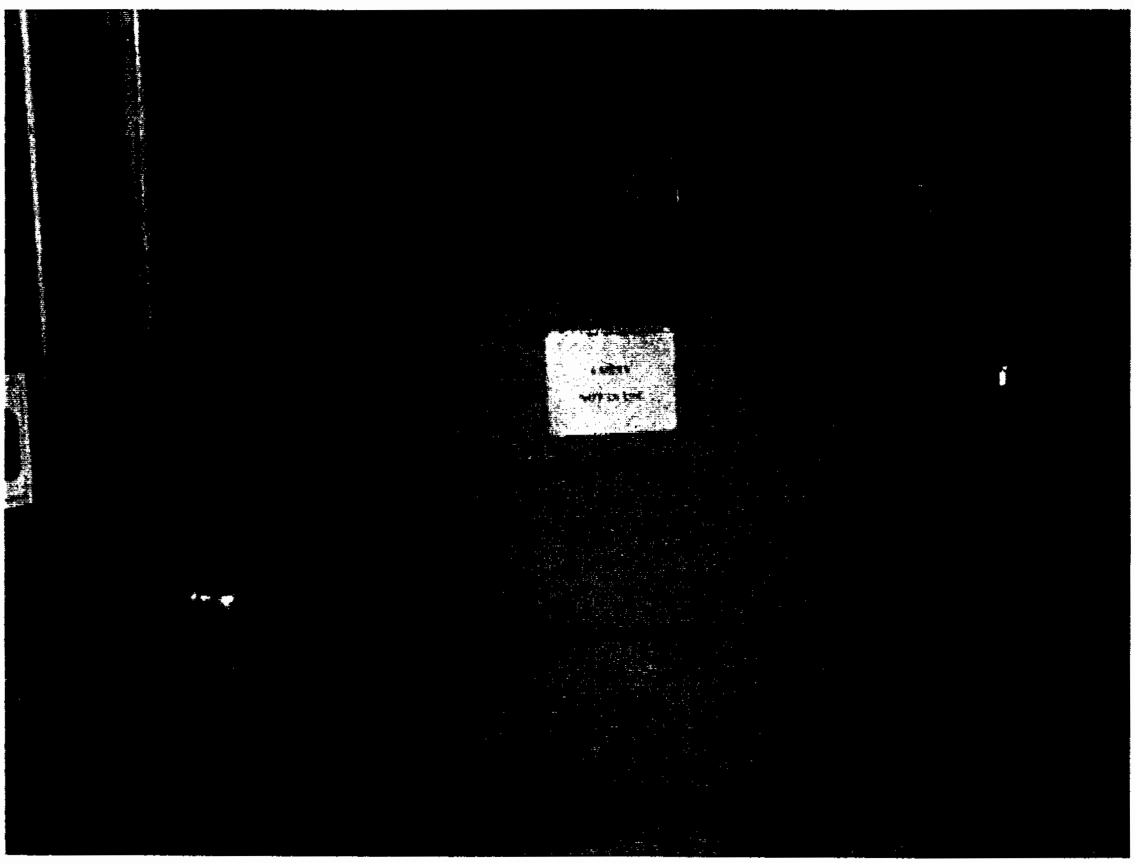
Picture #9 - Sump in the wet lab (Building #2)



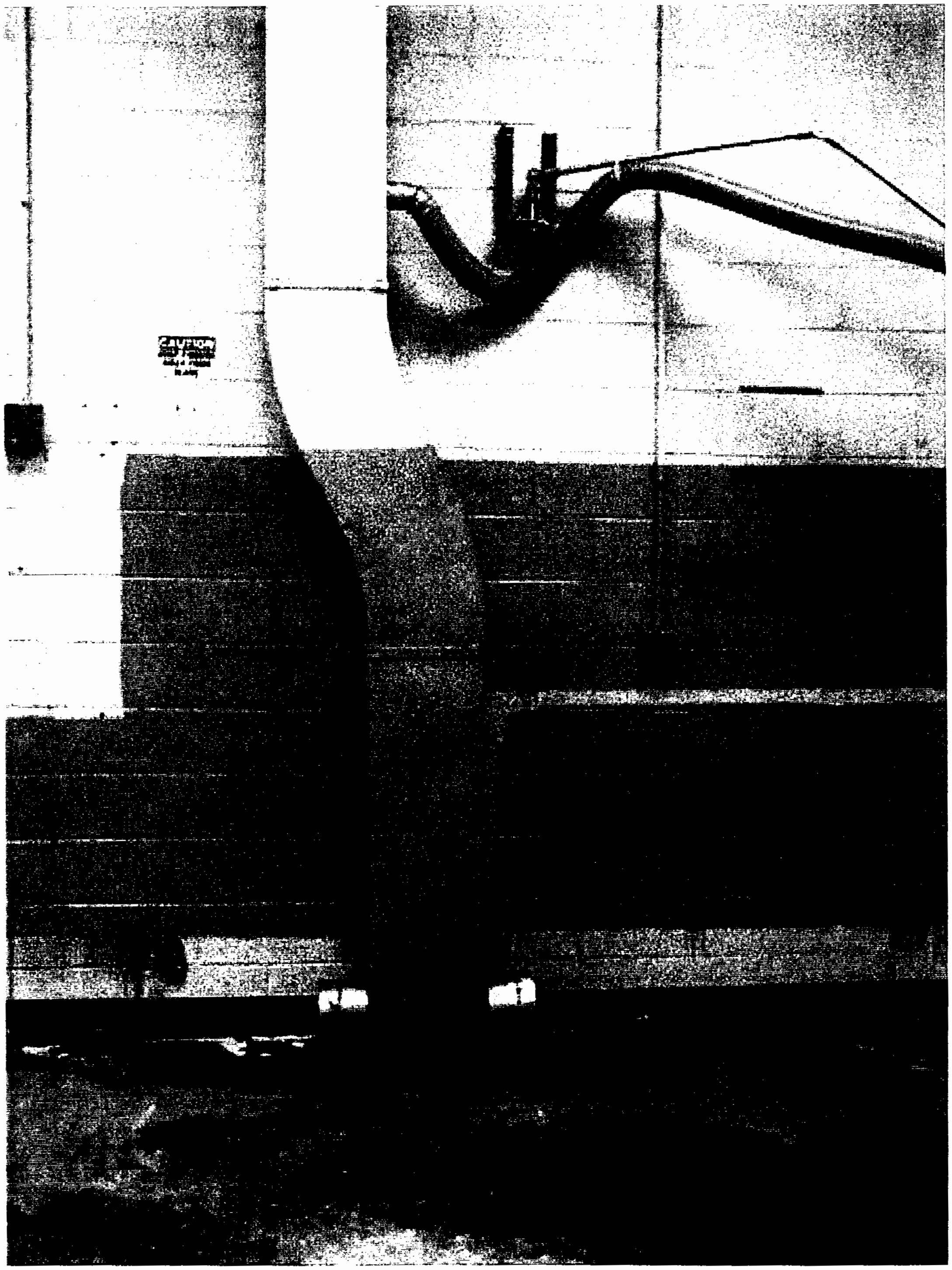
Picture #10 - Empty tank in the wet lab (Building #2)



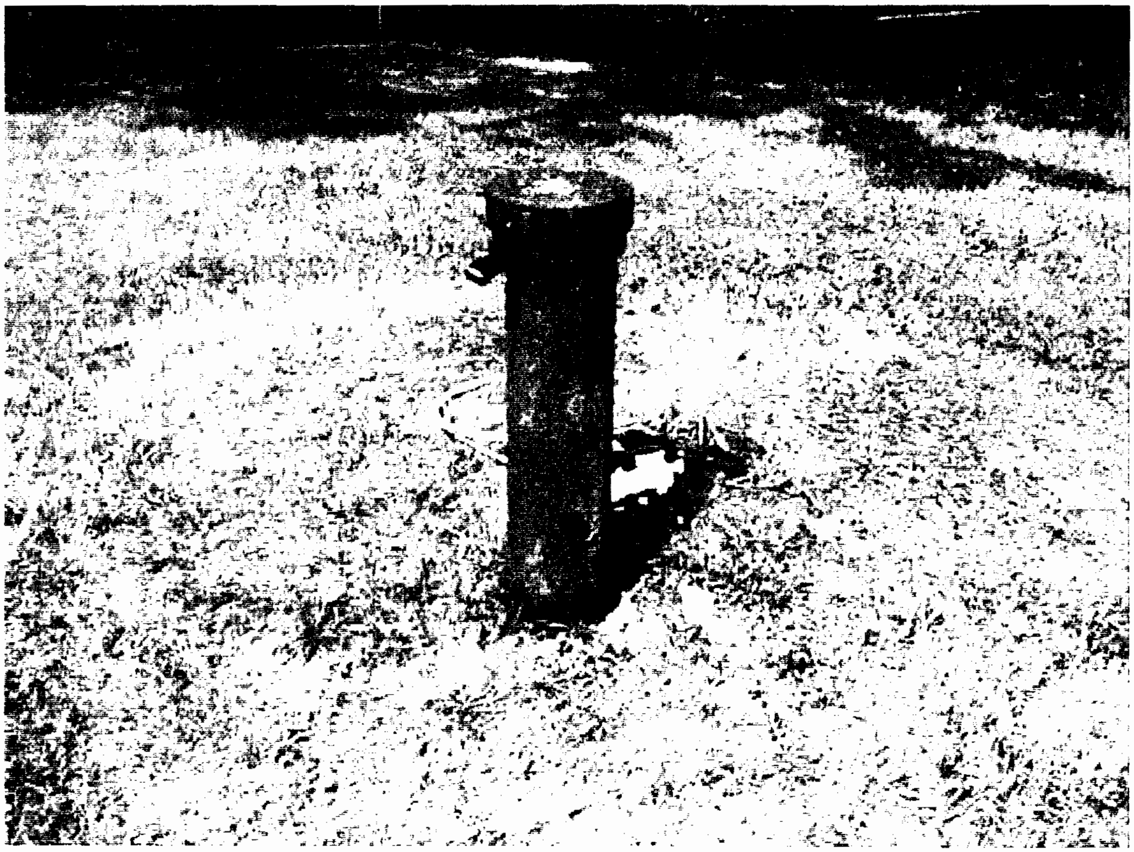
Picture #11 - Hood with references to hydrochloric acid and platinum in the wet lab (former Building #2)



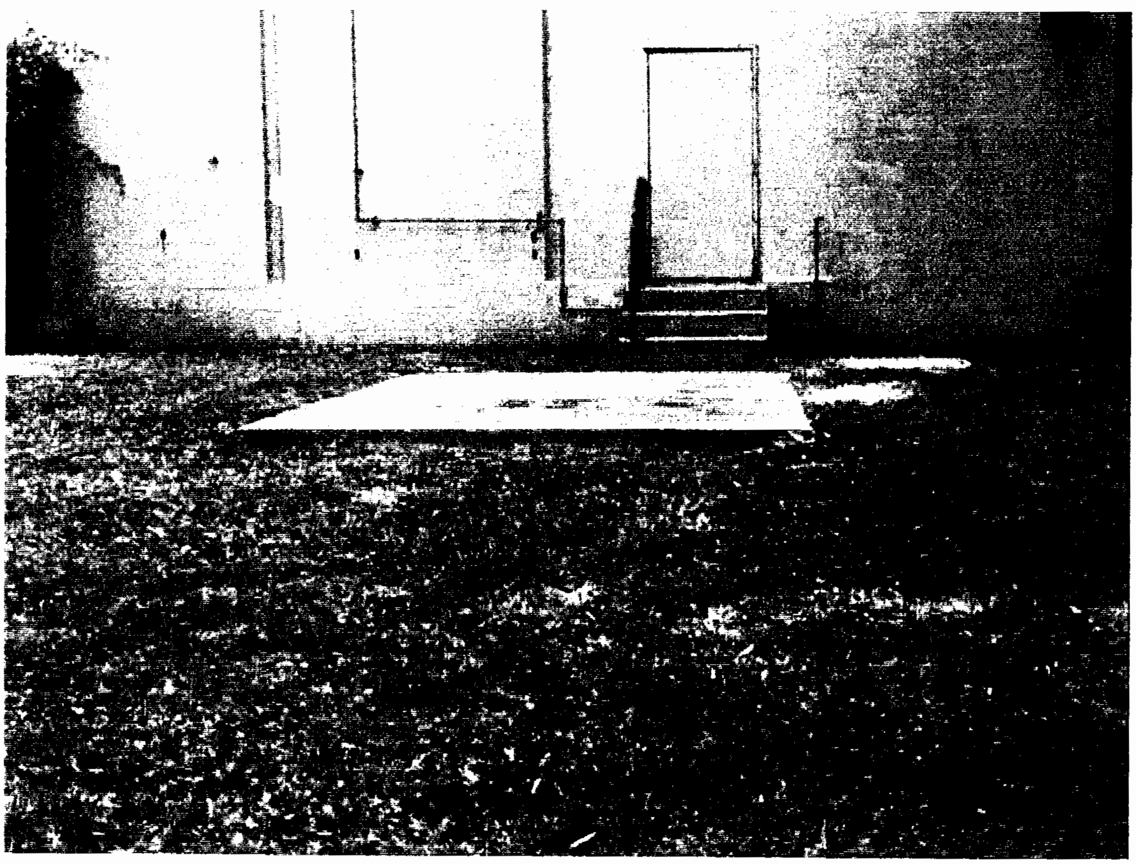
Picture #12 - Empty tank in maintenance area (Building #2)



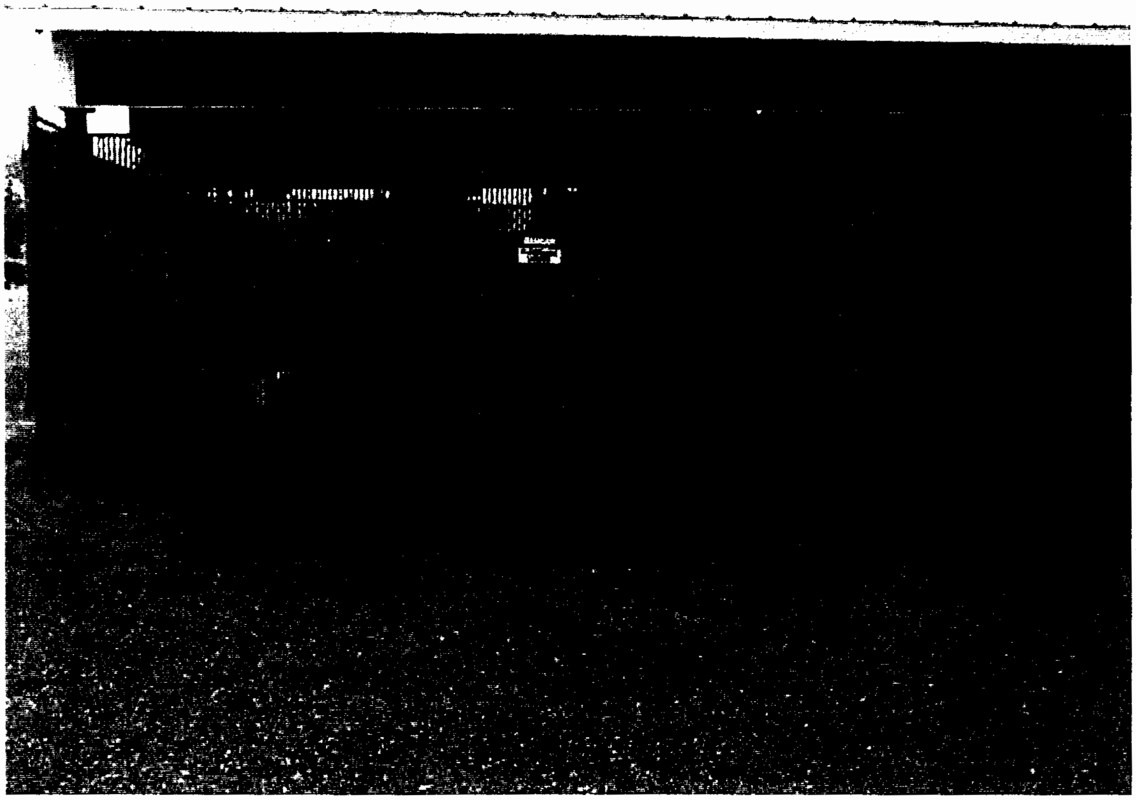
Picture #13 - Process exhaust (Building #2)



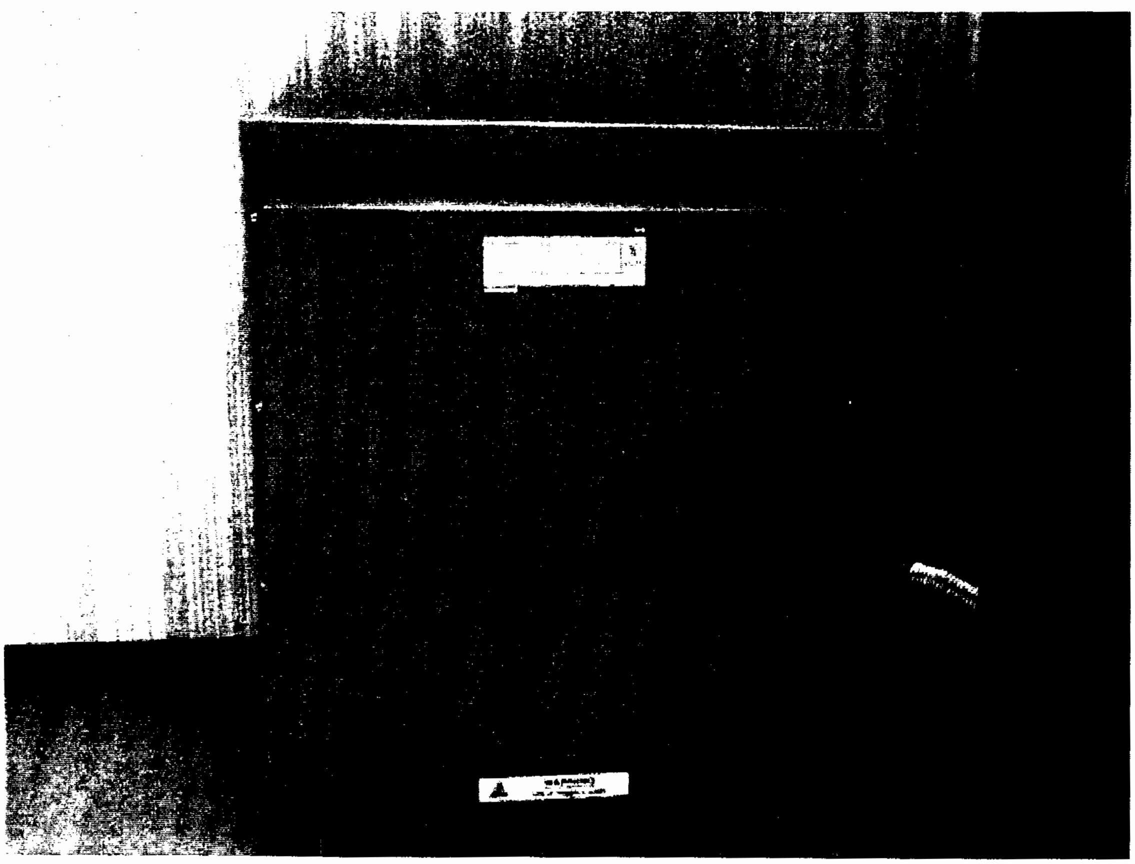
Picture #14 - Monitoring well located behind former Building #2



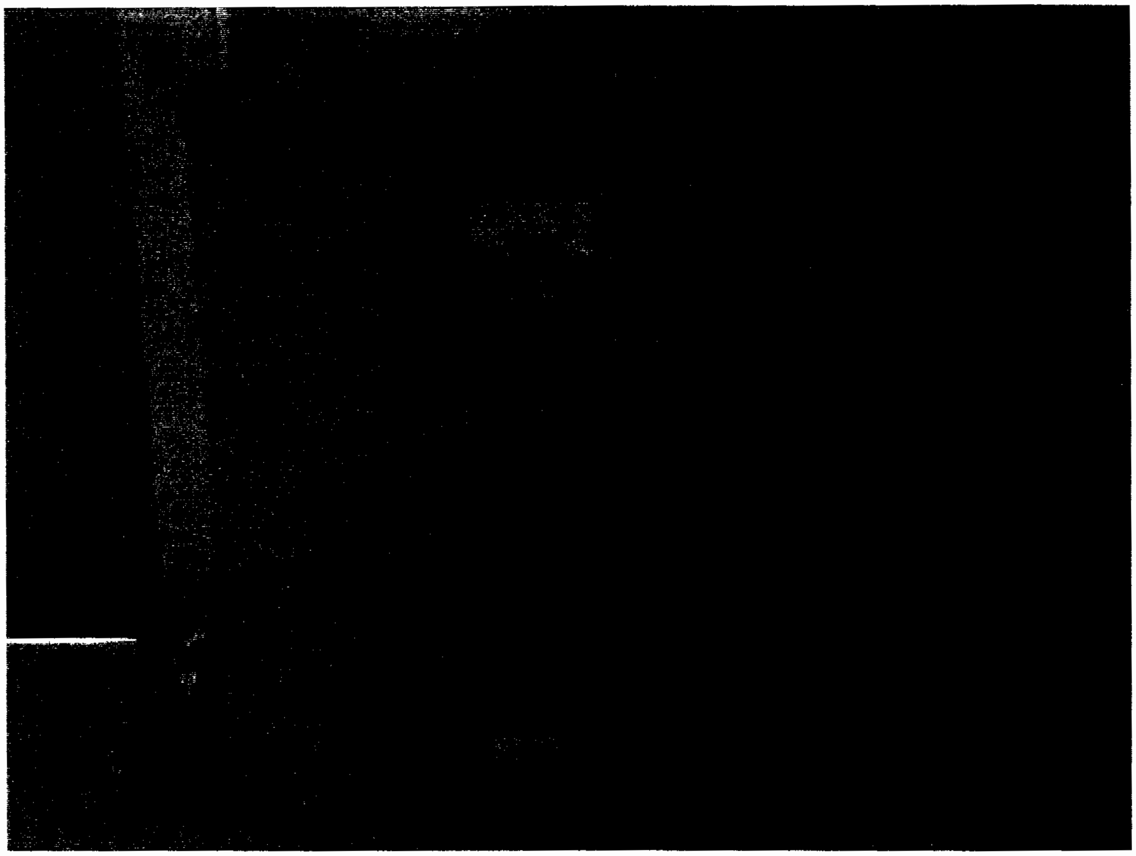
Picture #15 - Area of the underground waste solvent tank (Building #2)



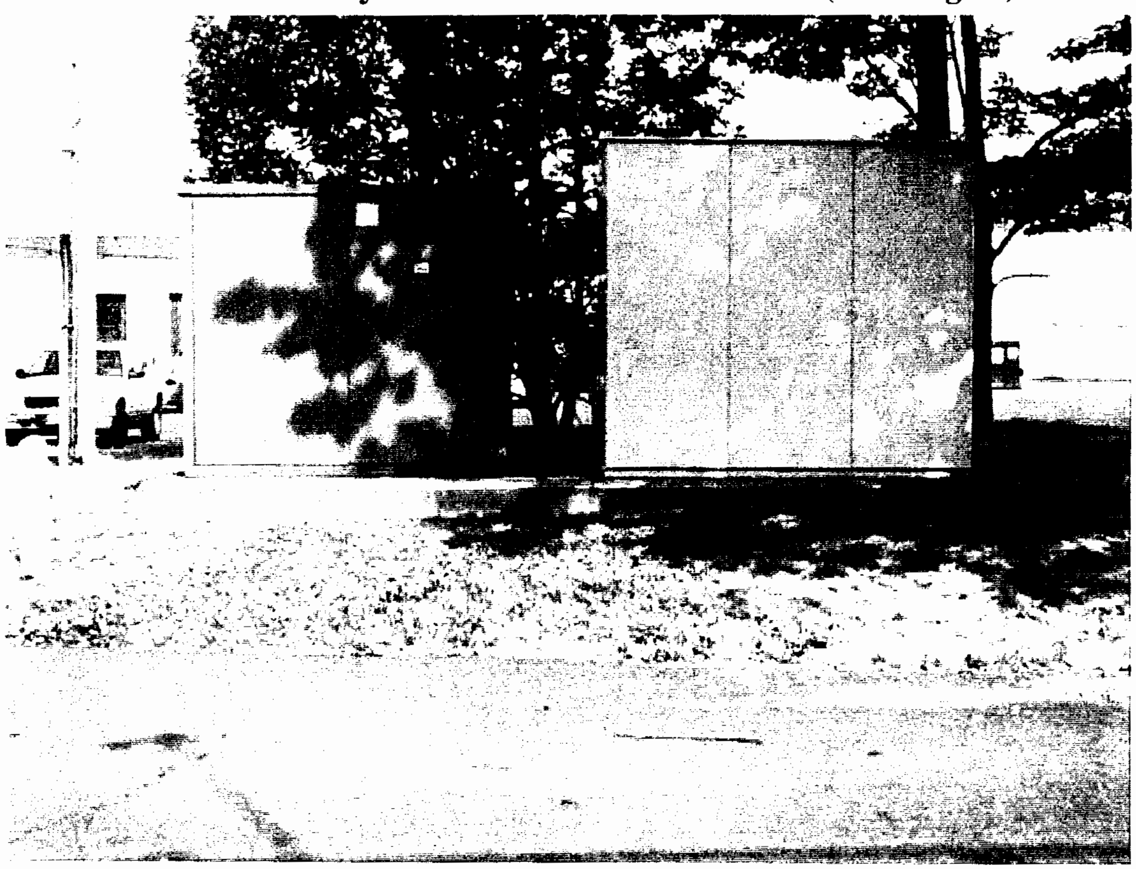
Picture #16 - Flammable liquid storage area in the parking lot (Building #2)



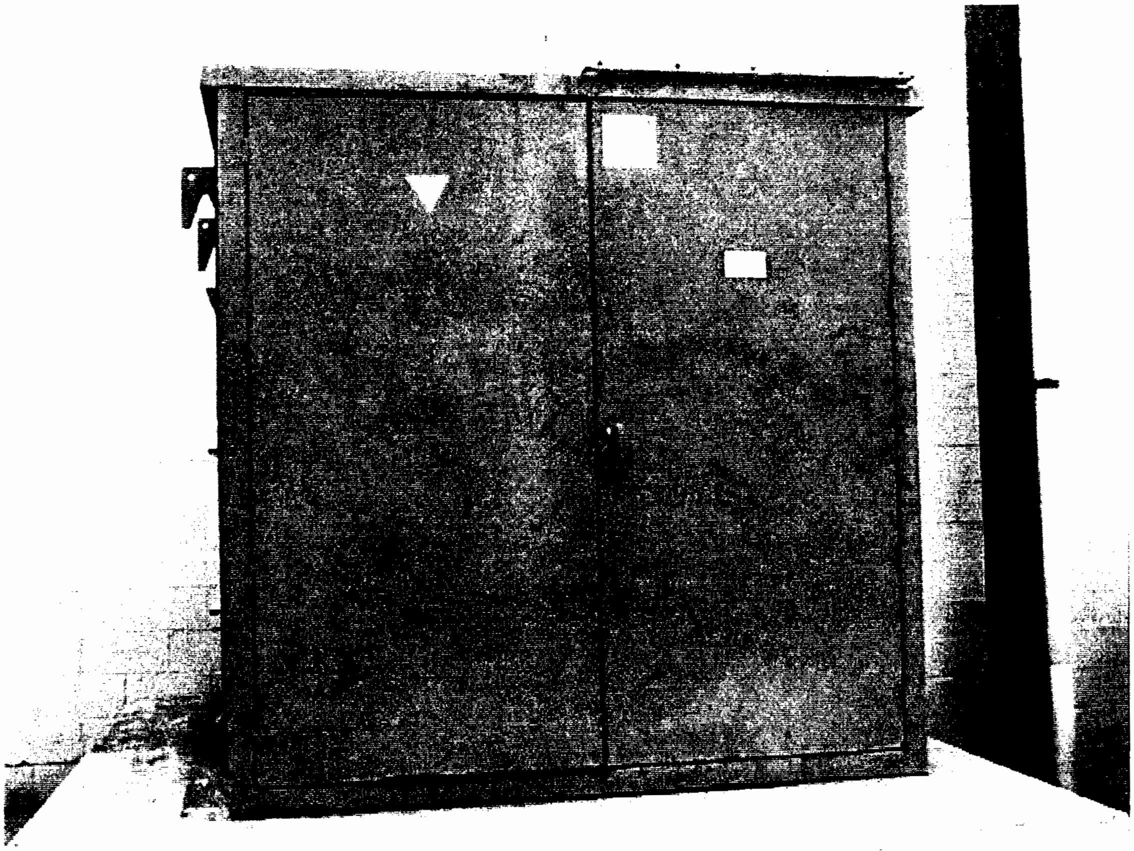
Picture #17 - Dry transformer in drying room (Building #2)



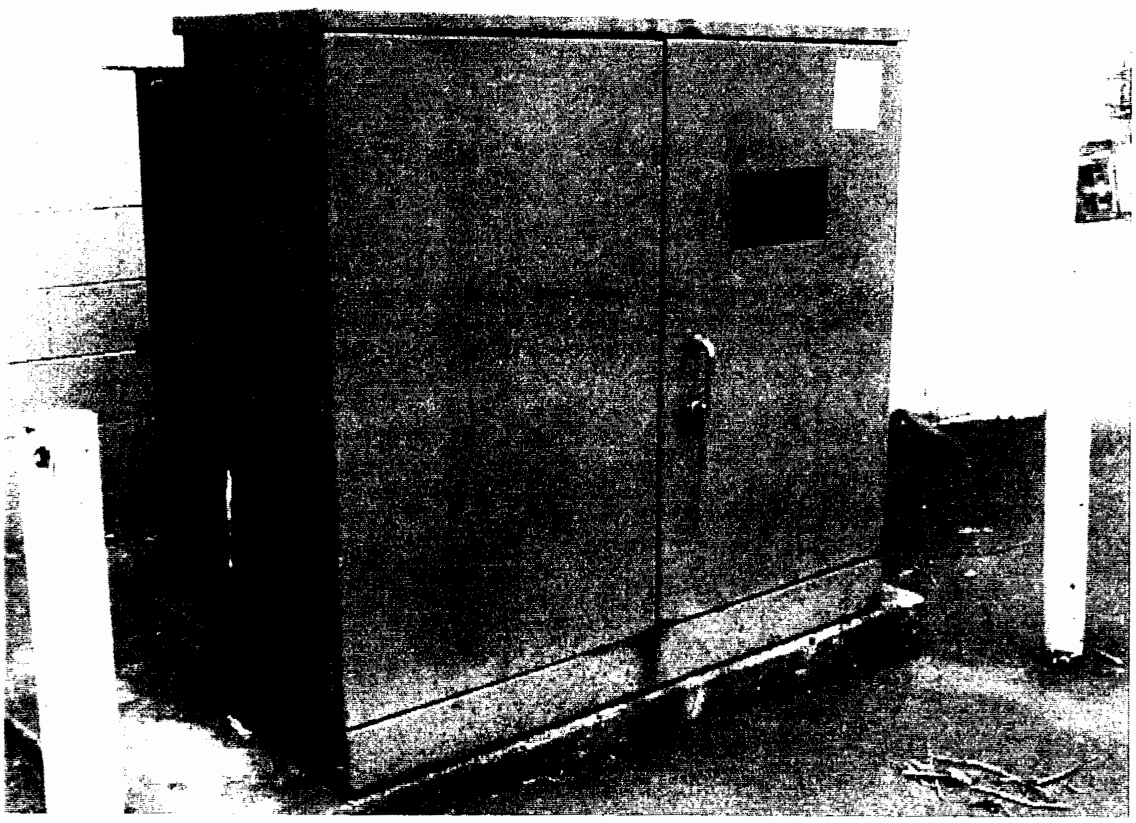
Picture #18 - Dry transformer in furnace room (Building #2)



Picture #19 - Transformers located behind former Building #2



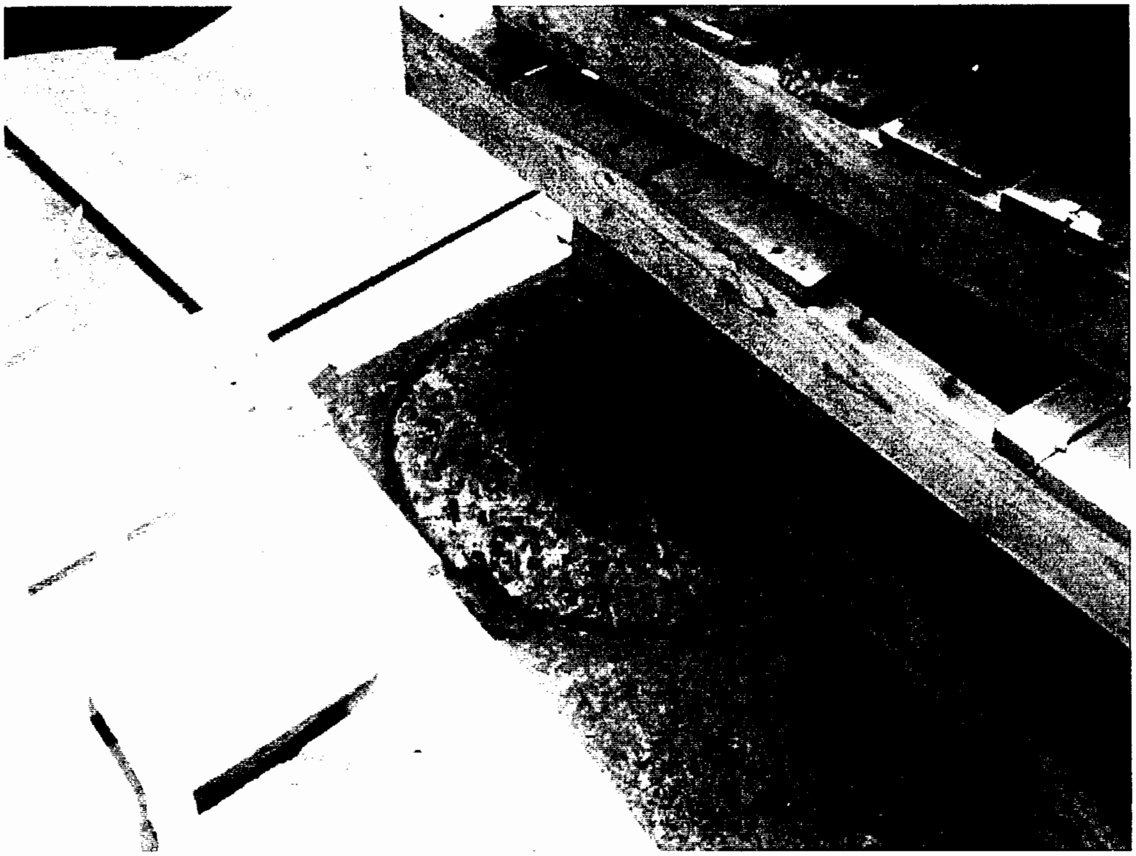
Picture #20 - Transformer located behind former Building #2



Picture #21 - Transformer located behind former Building #2

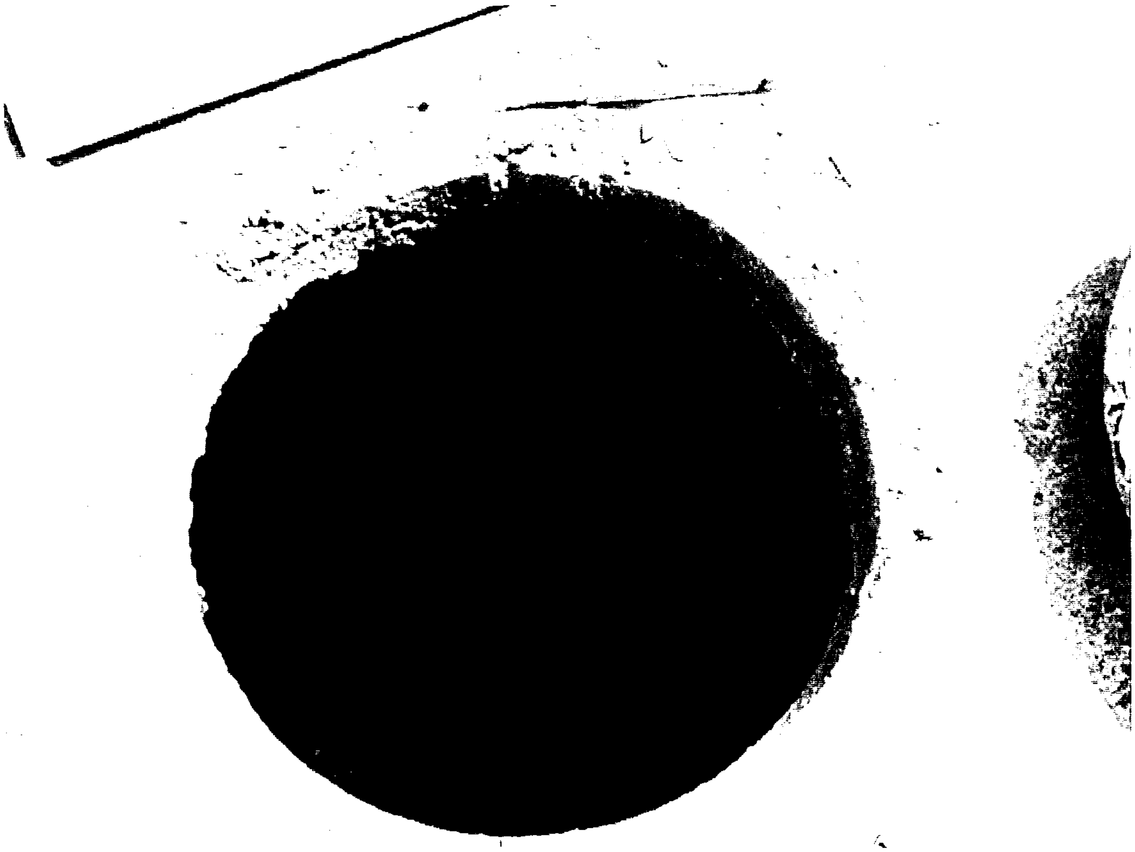
Picture #22 - Transformers on former Building #2 property facing Enterprise Road

Picture #23 - Former acid storage tank (Building #3 property)

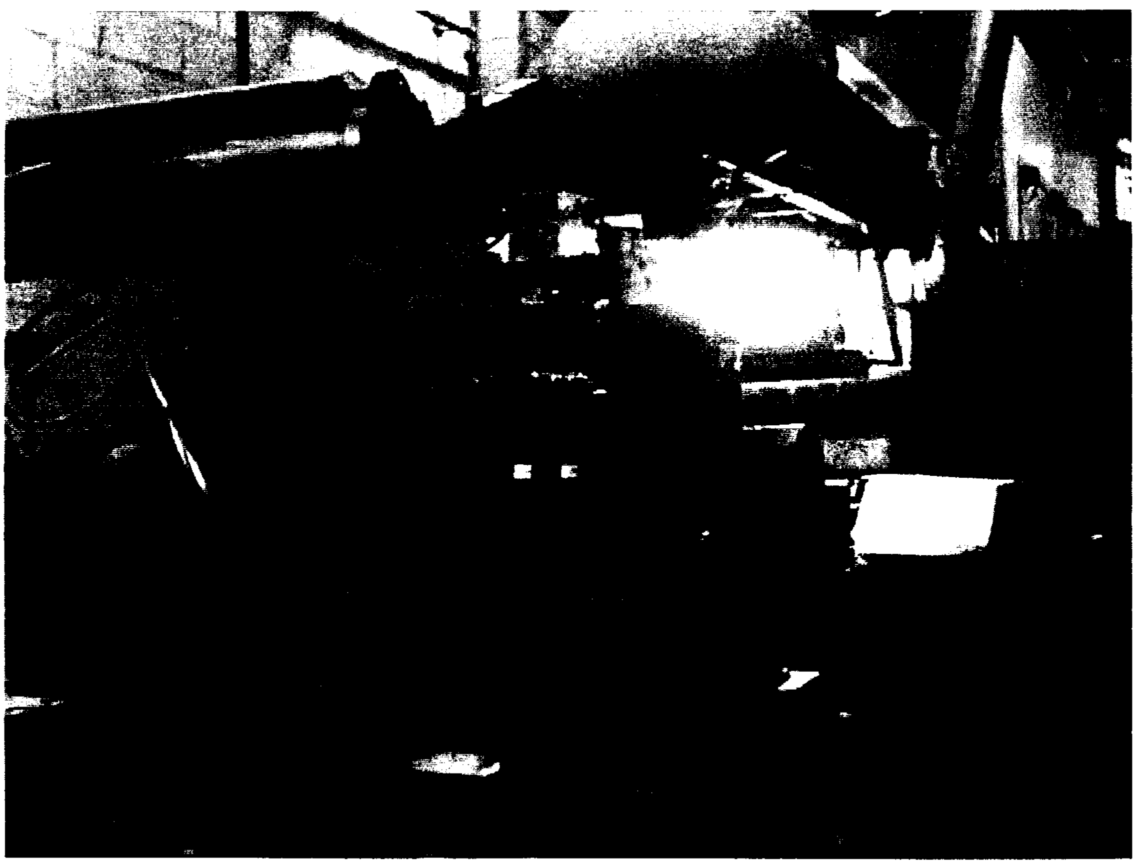


Picture #24 - Former acid storage tank (Building #3 property)

Picture #25 - Soil and water with sheen in former acid tank (Building #3 property)



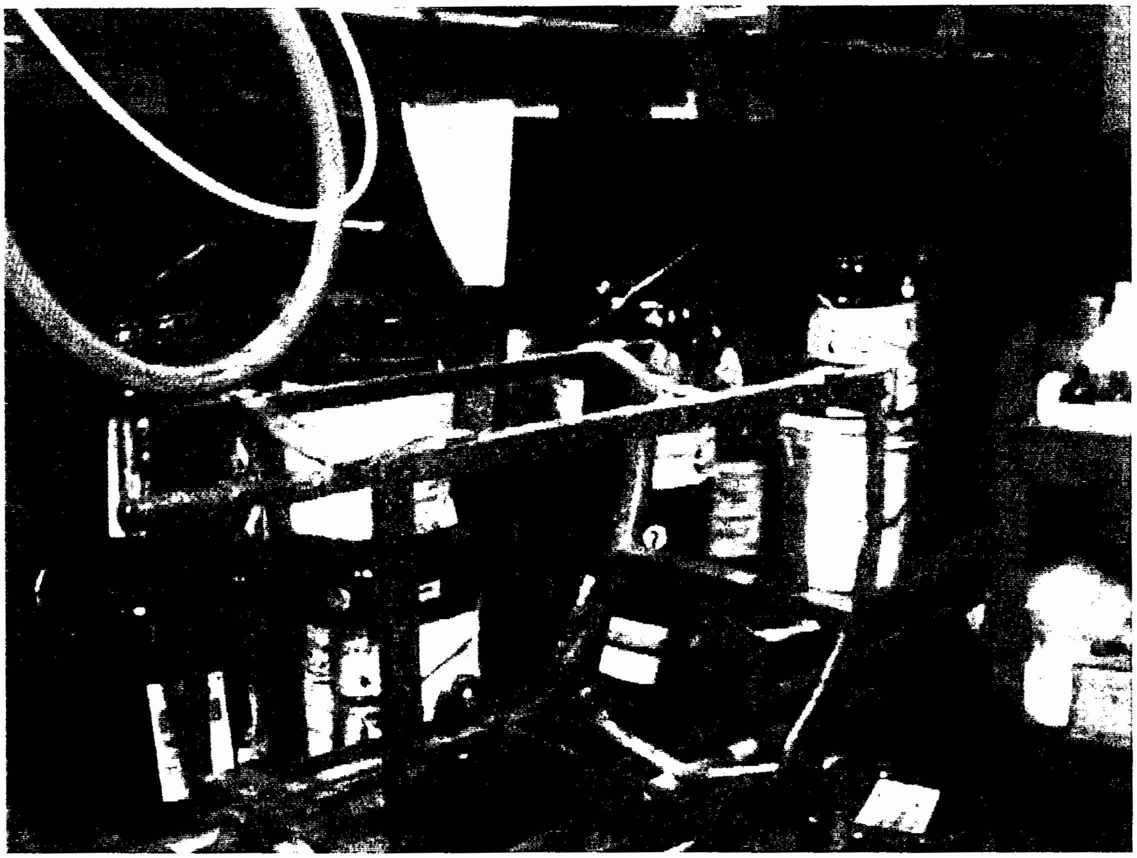
Picture #26 - Soil and water in former acid tank (Building #3 property)



Picture #27 - Coater in former Building #3

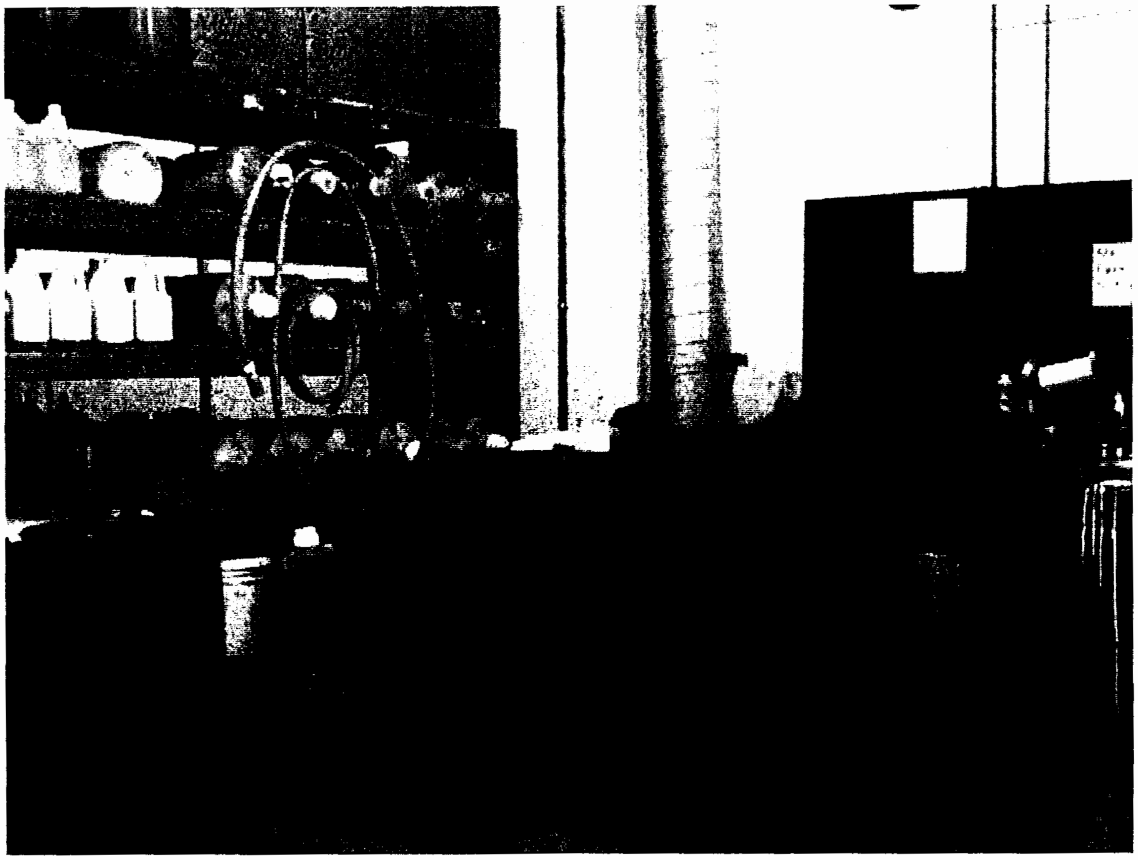
Picture #28 - Thermal oxidizer in the rear on the former Building #3

Picture #29 - Solvent storage area (Building #3)

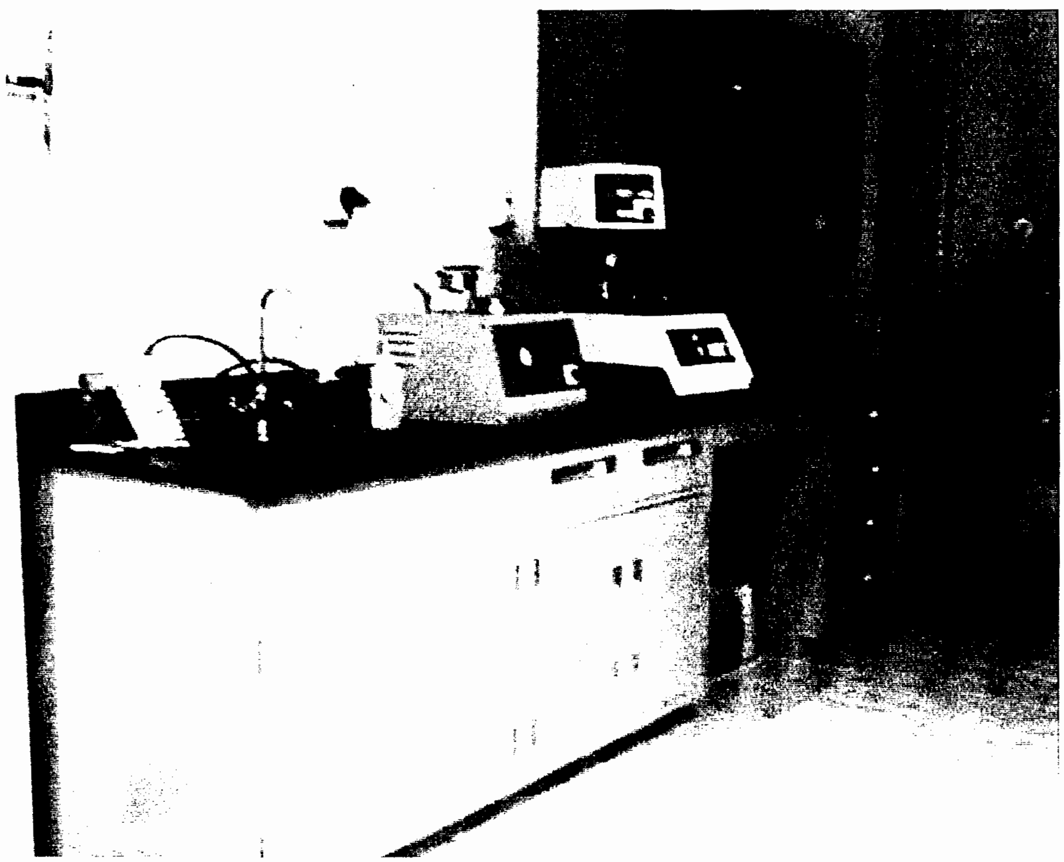


Picture #30 - Solvent storage area (Building #3)

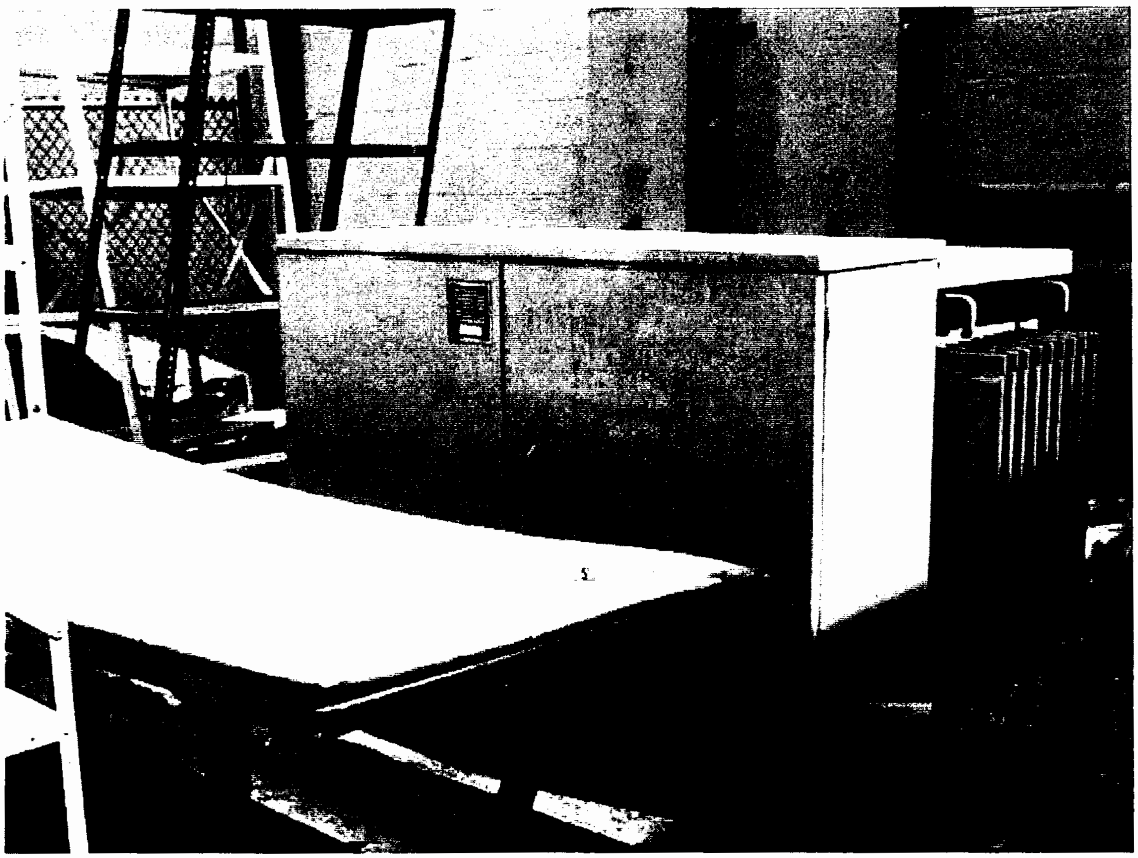
Picture #31 - Solvent cleaning area (Building #3)



Picture #32 - Sink with sanitary drain in the printing ink area (Building #3)

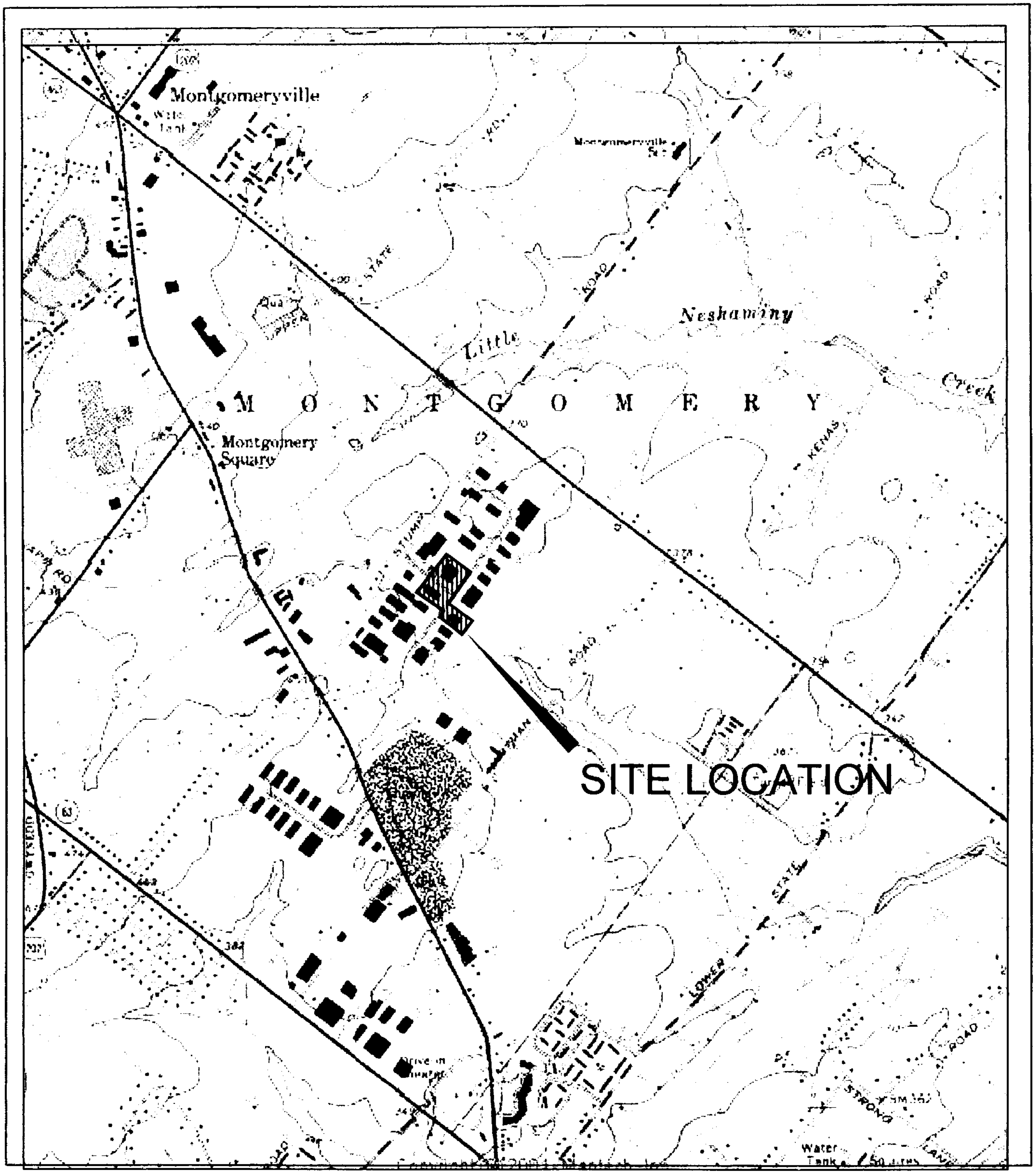


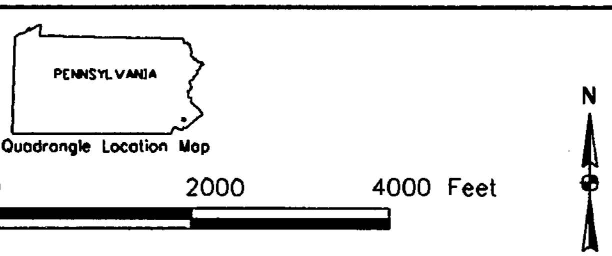
Picture #33 - Laboratory with sanitary drain (Building #3)



Picture #34 - Transformer on the former Building #3 property

APPENDIX B
SITE LOCATION MAP
SOLID STATE SCIENTIFIC, INC.
MONTGOMERYVILLE, PA





Quadrangle Location Map

0 2000 4000 Feet

Source: U.S.G.S. Topographic Maps (7.5 Minute)
AMBLER, PA

Commonwealth of Pennsylvania
Department of Environmental Protection

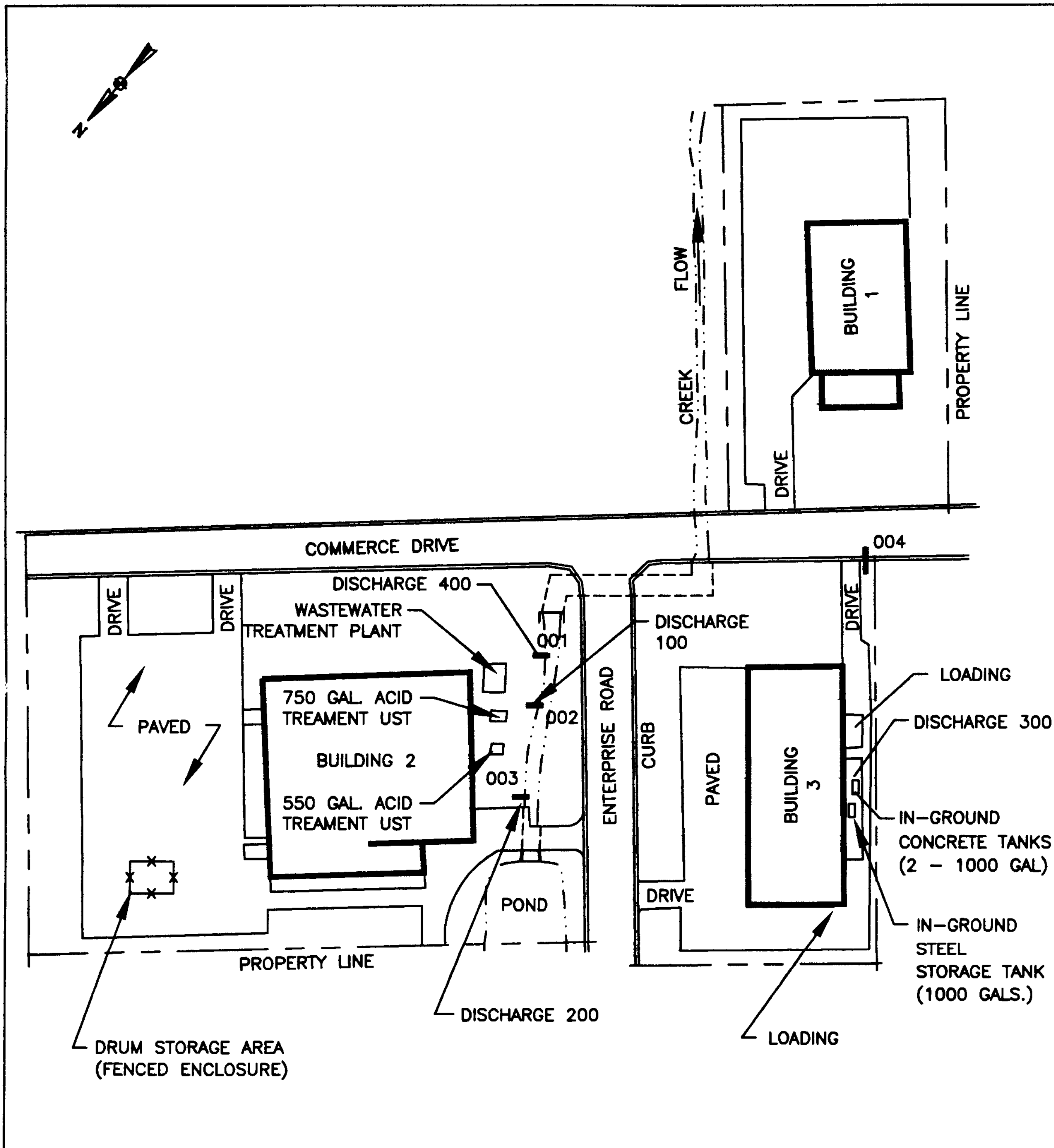
Solid State Scientific, Inc

Figure 1

Site Location Map

FOSTER WHEELER ENVIRONMENTAL CORPORATION

site investigations\Solid_State_Scientific.dwg



NOT TO SCALE

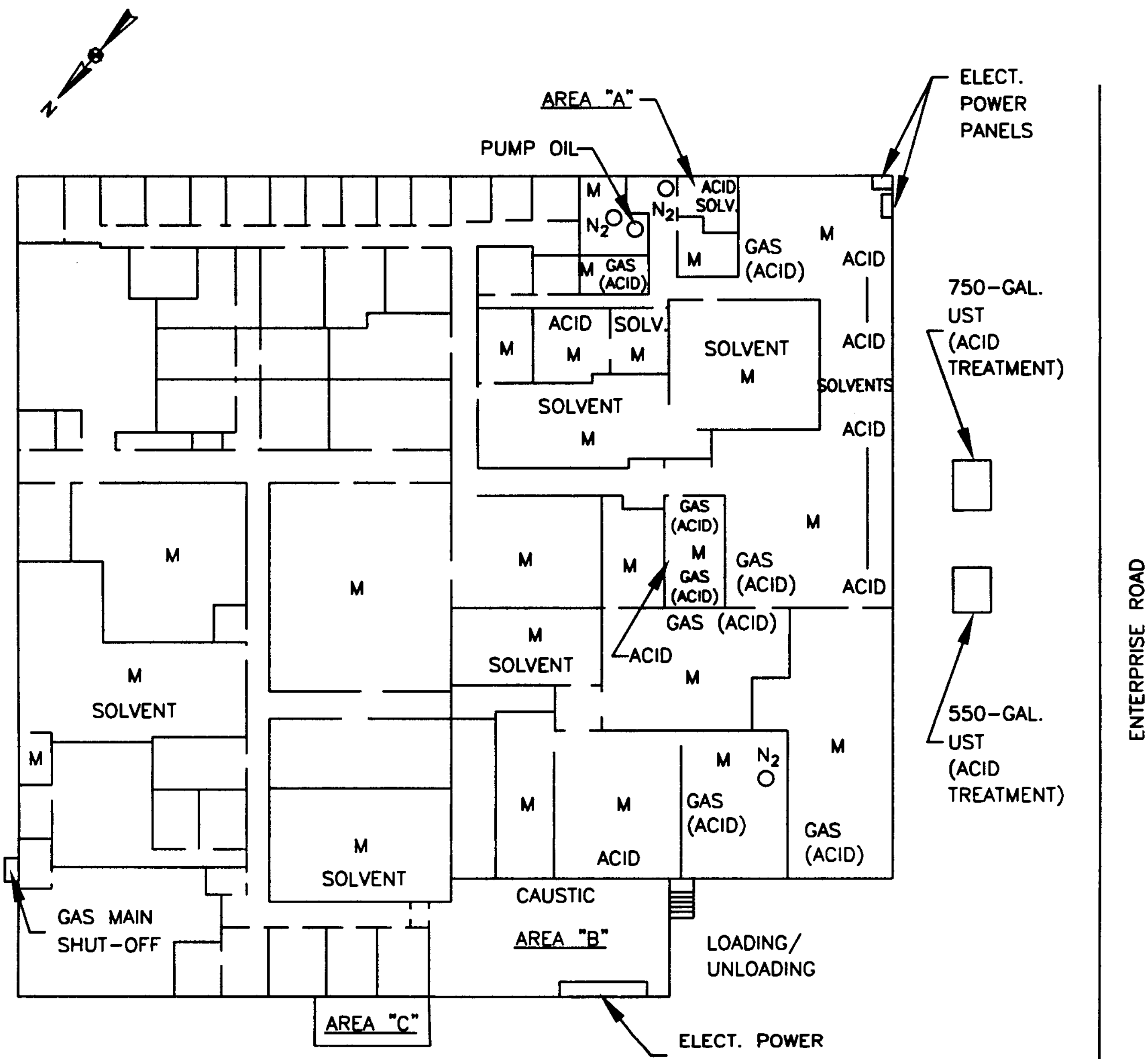
CAD FILE: \ENVT INVESTIGATIONS 2002\SOLID_STATE_SCIENTIFIC_SITE_LAYOUT.DWG

Commonwealth of Pennsylvania
Department of Environmental Protection

Solid State Scientific, Inc

FIGURE 2
FORMER SITE LAYOUT

FOSTER WHEELER ENVIRONMENTAL CORPORATION



AREA A:	ACIDS – 140 GAL.
	SOLVENTS – 40 GAL.
	CAUSTICS – 90 GAL.
AREA B:	CAUSTICS – 500 LBS.
AREA C:	BOTTLE GASES – 12 CYL.

LEGEND:

M MANUFACTURING AREA

NOT TO SCALE

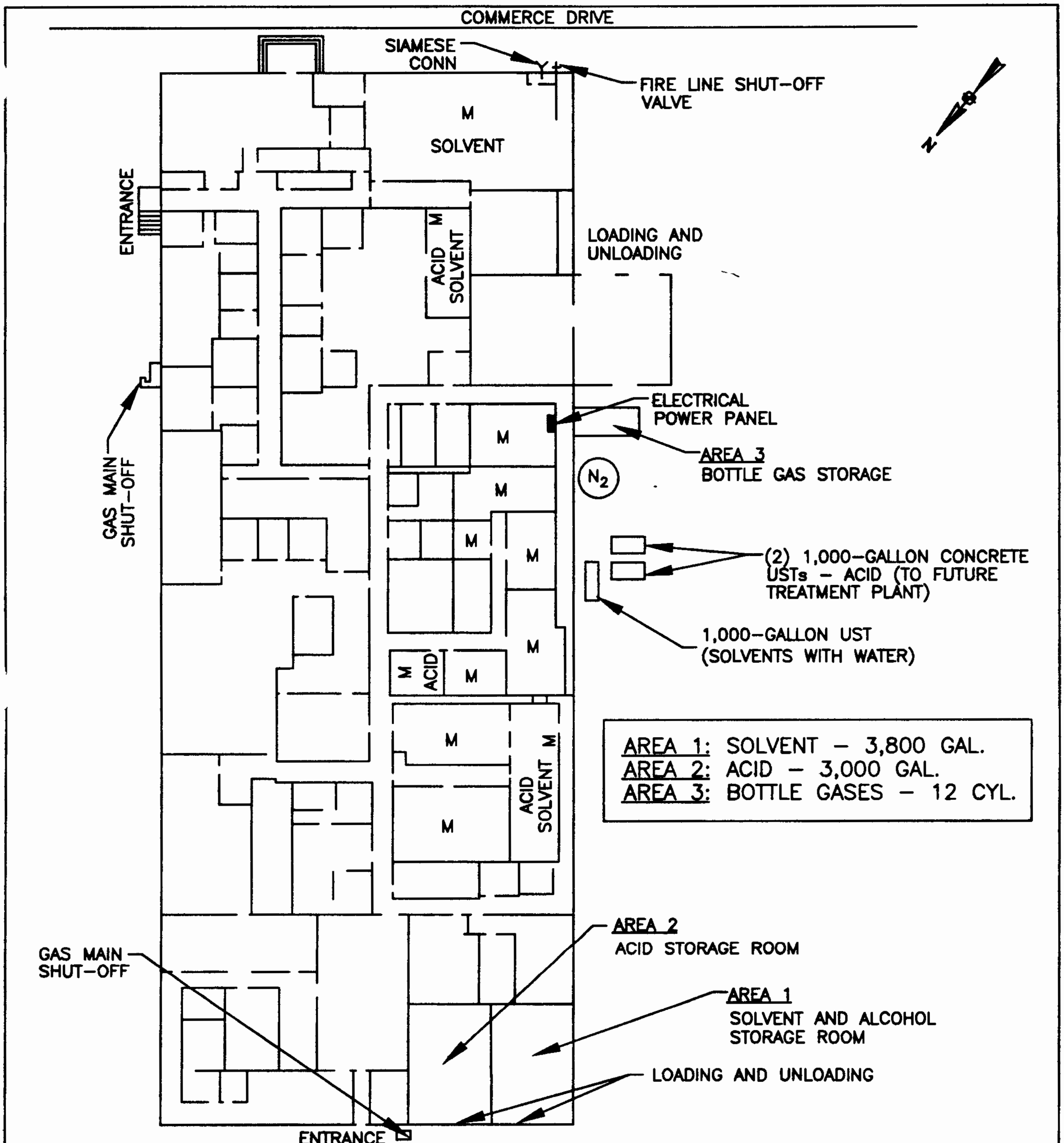
CAD FILE: \ENVT INVESTIGATIONS 2002\SOLID_STATE_SCIENTIFIC_BLDG2.DWG

Commonwealth of Pennsylvania
Department of Environmental Protection

Solid State Scientific, Inc

FIGURE 3
FORMER BUILDING 2 LAYOUT

FOSTER WHEELER ENVIRONMENTAL CORPORATION



LEGEND:

M MANUFACTURING AREA

NOT TO SCALE

CAD FILE: \ENVT INVESTIGATIONS 2002\SOLID_STATE_SCIENTIFIC_BLDG3.DWG

Commonwealth of Pennsylvania
Department of Environmental Protection

Solid State Scientific, Inc

FIGURE 4
FORMER BUILDING 3 LAYOUT

FOSTER WHEELER ENVIRONMENTAL CORPORATION

APPENDIX C
INVENTORY OF DOCUMENTATION AND
REFERENCE DOCUMENTS
SOLID STATE SCIENTIFIC, INC.
MONTGOMERYVILLE, PA

APPENDIX C
INVENTORY OF DOCUMENTATION
SOLID STATE SCIENTIFIC, INC.
MONTGOMERYVILLE, PA

1. **February 15, 2002** Letter from PADEP to SSS regarding RCRA Corrective Action at the facility
2. **December 1981** Preparedness, Prevention, and Contingency Plan
3. **April 1976** Wastewater Characterization and Concept Design Report
4. **November 19, 1980** Part A Application
5. **January 19, 1982** Part A Application
6. **March 24, 1975** Letter from PADEP to SSS regarding Solvent Spill
7. **March 27, 1975** Letter from SSS to PADEP regarding Solvent Spill Problems
8. **November 1, 1978** Letter from PADEP to SSS regarding NPDES Application No. PA0050130
9. **February 23, 1976** Results of Waste Characterization Study
10. **April 4, 1979** Letter from PADEP to SSS regarding Application Nos. PA0050130 and 4678203
11. **June 11, 1979** Letter from SSS to PADEP regarding Industrial Waste
12. **July 9, 1979** NPDES Application
13. **December 1979** Internal Review and Recommendations for NPDES Permit
14. **November 27, 1984** Letter from SSS to PADEP regarding NPDES Permit
15. **September 11, 1980** Letter from PADEP to SSS regarding Industrial Waste Permit No. PA0050130
16. **October 6, 1981** Letter from PADEP to SSS regarding Industrial Waste Permit No. PA0050130
17. **September 15, 1981** PADEP Memo regarding Letter Agreement
18. **November 23, 1981** Letter from PADEP to SSS regarding Industrial Waste Permit No. PA 0050130
19. **October 12, 1981** Progress Report – Month of September 1981
20. **December 11, 1981** Letter from SSS to PADEP regarding Wastewater Treatment Plant
21. **December 17, 1981** Cover Letter from PADEP to SSS for Consent Order and Agreement
22. **January 14, 1982** Consent Order and Agreement
23. **November 1982** Letter from PADEP to SSS regarding Consent Order and Agreement
24. **August 15, 1980** Notification of Hazardous Waste Activity
25. **January 21, 1981** Letter from SSS to USEPA regarding Revisions to PAD002278331
26. **January 23, 1981** Letter from SSS to USEPA regarding Revisions to PAD002278331
27. **July 27, 1981** Letter from USEPA to SSS regarding Part A Application

28. **February 18, 1982** Letter from USEPA to SSS regarding Change of Operations during Interim Status
29. **March 4, 1983** Letter from PADEP to SSS regarding Request for Part B Application
30. **November 9, 1984** Hazardous Waste Inspection Report
31. **December 1984** SSS Montgomeryville Facility Closure Plan
32. **December 14, 1984** Letter from PADEP to SSS regarding Closure Plan
33. **March 11, 1985** Letter from PADEP to SSS regarding Closure
34. **March 27, 1985** Letter from PADEP to SSS regarding Closure
35. **January 7, 1985** Letter from PADEP to SSS regarding Closure Plan
36. **March 28, 1985** Letter from PADEP to SSS regarding PAD002278331
37. **September 16, 1985** Letter from SSS to PADEP regarding Closure
38. **September 26, 1985** Closure Certificate
39. **April 24, 1981** Review (Form No.1) for Plan Approval
40. **January 22, 1982** Operating Permit #46-399-048
41. **September 14, 1981** PADEP Memo regarding Treatment Plant
42. **October 19, 1981** Monthly Status Report for the Wastewater Treatment Plant
43. **November 5, 1981** Letter from PADEP to DRBC regarding Industrial Waste Treatment Facility
44. **June 10, 1982** Water Pollution Control Application
45. **June 21, 1982** Letter from PADEP to DRBC regarding Application #4682201
46. **June 29, 1982** Letter from SSS to PADEP regarding Application #4682201
47. **March 25, 1983** Letter from SSS to PADEP regarding NPDES No. PA0050130 and PADEP's March 16th Letter
48. **August 30, 1983** Letter from PADEP to SSS regarding Industrial Waste/NPDES Permit # PA005130
49. **January 22, 1985** Letter from SSS to PADEP regarding Discharge 300
50. **March 4, 1985** Letter from SSS to PADEP regarding Building #2 Discharges
51. **May 21, 1985** Storch Engineers Field Report #1
52. **September 12, 1985** Storch Engineers Memo regarding Building #2 Closure
53. **October 17, 1989** Preliminary Assessment
54. **August 18, 1981** Letter from SSS to PADEP regarding Industrial Waste Application #4681202
55. **June 13, 1986** Letter from SSS to PADEP regarding Building #2 Closure
56. **May 26, 1987** Boring Logs for B20, B18, B16, B14, B12, B4 and B2
57. **April 8, 1987** Letter from Dames & Moore to HVDC regarding Groundwater Sampling, Analysis, and Data Evaluation Building No. 2
58. **June 3, 1987** Report Limited Subsurface Environmental Evaluation Building #2
59. **November 2, 1987** Letter from PADEP to HVDC regarding Groundwater Contamination
60. **September 15, 1987** Letter from Dames & Moore to USEPA regarding Request for EPA I.D. Number
61. **January 21, 1988** Desk Memorandum regarding Site Visit
62. **May 22, 1985** Storch Engineers Field Report #2
63. **May 23, 1985** Storch Engineers Field Report #3
64. **December 19, 1991** Operating Permit #46-318-023 (1st page only)

65. **January 22, 1992** Operating Permit #46-318-022 (1st page only)
66. **December 5, 1997** Operating Permit #46-318-038 (1st page only)
67. **October 13, 1987** PADEP review of SSS Report and Work Plan
68. **April 16, 1975** Letter from SSS to PADEP regarding Tank and Contaminated Soil

REFERENCE DOCUMENTS

1. February 15, 2002 Letter from PADEP to SSS regarding RCRA Corrective Action at the facility

Provided by: PADEP

Pennsylvania Department of Environmental Protection
Rachel Carson State Office Building
P.O. Box 8471
Harrisburg, PA 17105-8471
February 15, 2002

Bureau of Land Recycling and Waste Management
717-787-6239

Solid State Scientific Inc.
3900 Welsh Rd.
Willow Grove, PA 19090-2905

Re: RCRA Corrective Action at Solid State Scientific Inc.
EPA ID #PAD 002278331

Dear Sir or Madam:

The purpose of this letter is to inform you that the Pennsylvania Department of Environmental Protection (PADEP), the United States Environmental Protection Agency (EPA) Region III, in conjunction with our consultant, Foster Wheeler Environmental Corporation, will be conducting a site visit in the next several months to determine if RCRA Corrective Action is necessary at your facility.

First, to inform you why we are initiating this inspection at your facility. Your facility is currently in EPA's RCRA Corrective Action program. EPA Region III utilized the National Corrective Action Priority System (NCAPS) Model to evaluate the relative priority of the Region III RCRA universe. The NCAPS Model is based on four different exposure pathways: groundwater, surface water, air and on-site soils (either by direct contact with hazardous materials or contact with contaminated surface soils). Based upon the NCAPS Model, your facility was ranked as a either a "medium" or "low" priority facility. The NCAPS modeling results mean that a facility ranked as either "medium" or "low" may, in fact, require no remediation. Because you are a "medium" or "low" priority facility, remediation may not be necessary because no hazardous waste releases have occurred at your facility. Also, if remediation was necessary at your facility, it may have already taken place under different authorities or as a facility-lead. The site visit will confirm whether or not corrective action is required at your facility.

If your facility has had hazardous waste releases in the past, the PADEP and EPA Region III is focusing on two interim Environmental Indicators: Human Exposures Controlled and Contaminated Groundwater Releases Controlled. In general terms, EPA considers the Environmental Indicators to be met where migration of groundwater releases has been controlled and human exposure pathways controlled or cut off so that the facility poses no unacceptable risk to human health and the environment under existing conditions at the facility. Even if these two Environmental Indicators are met, additional remediation may still be necessary for the final corrective measures.

EPA encourages public involvement in all stages and aspects of the Corrective Action process. If it is determined that "No further Corrective Action" is necessary at your facility, or if a final remedy selection is made, these will both include a formal decision-making process which incorporates public involvement.

To avoid future hazardous waste releases the EPA Region III Waste and Chemicals Management Division is placing an emphasis on hazardous waste minimization. EPA has assembled a Waste Minimization Team to assist hazardous waste generators with implementing a comprehensive waste minimization program. The services provided by the Waste Minimization Team can be used on a voluntary basis and are described in the enclosed brochure. Many facilities have benefited from this program by realizing significant cost and waste reductions (see enclosed brochure).

EPA Region III recently tasked the PADEP and Foster Wheeler Environmental Corporation to review file information and conduct a site visit at your facility to gather relevant information for EPA and the PADEP to determine whether or not Corrective Action is necessary at your facility. Information which will be discussed at the site visit to determine the status of the Corrective Action program may include the following:

- An outline of the operational history of the facility including all wastes generated at the facility and their management;
- A brief description of all areas where hazardous constituents may have been released to the air, soils, groundwater and surface waters (e.g., Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs);
- A description of known releases and potential releases at each SWMU and AOC;
- A description of exposure pathways for all releases and potential releases;
- A summary of existing investigative information;
- A description of all exposure pathway controls and/or release controls instituted at the facility and how these achieve or contribute toward achieving the two environmental indicators;
- Up-to-date information about Corrective Action goals previously accomplished at your facility;
- Your views as to how Corrective Action can proceed at your facility;
- Any other issues that you would like to discuss.

The PADEP or Foster Wheeler Environmental will be contacting you within the next several weeks to set up this site visit.

I thank you in advance for your cooperation during this anticipated site visit. Should you have any questions or concerns regarding this letter, please feel free to contact Joseph Hayes or Nick Molina of my staff at 717-787-6239.

Sincerely,

D. Richard Shipman
Chief
Division of Hazardous Waste Management

Enclosure

bcc: Denis Zielinski, US EPA
Paul Gotthold, EPA
Charles Scheidler
Nick Molina
File

DS:NM:smt

2. December 1981 Preparedness, Prevention, and Contingency Plan

Provided by: PADEP files

SOLID STATE SCIENTIFIC, INC.

Montgomeryville, Pa.

PREPAREDNESS, PREVENTION, AND CONTINGENCY PLAN

(PPCP)

April 10, 1981
May 2[illegible], 1981 Rev.
July 21, 1981 Rev.
December, 1981 Rev.

NARRATIVE

Solid State Scientific, Inc. is a semiconductor manufacturing house which was established approximately 14 years ago. At S.S.S.I., we manufacture L.S.I. (Large Scale Integrated) circuits. These circuits are basically small electronic brains which will be used in many different applications in electronics such as watches, auto clocks, smoke detectors, computer memories, space and tele-communications, military communications and many more.

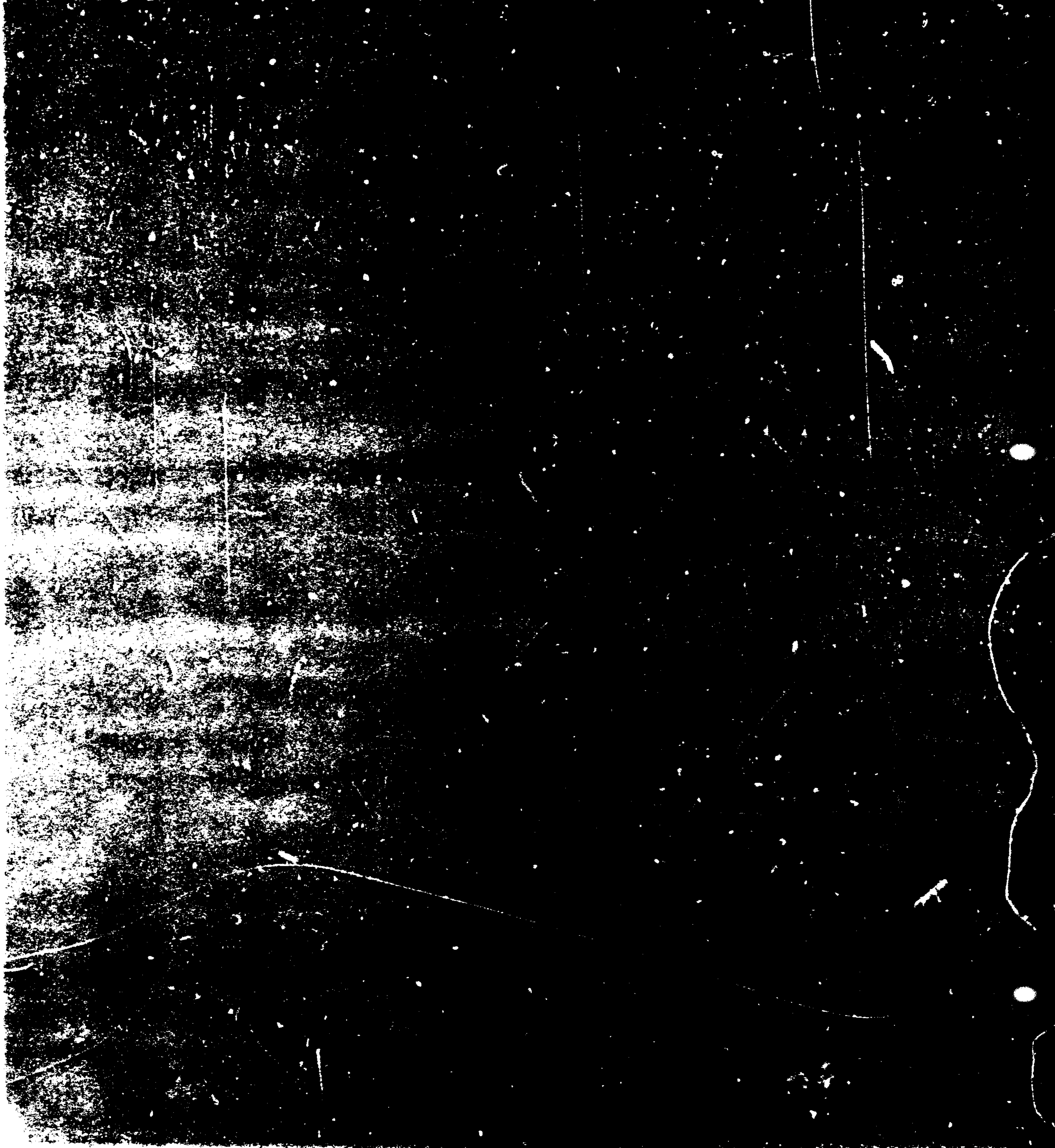
The processing of these circuits is a sensitive, complex procedure which requires expert skill and above all an ultra-clean manufacturing environment. The circuits are processed on the surface of a silicon wafer. One wafer will contain as many as 800 individual circuits. The wafers are mass produced in Wafer Fab using photographic techniques, high temperature heat treatments and chemical processing. The wafers then travel on to the Test Area where each circuit on the wafer is tested electrically. Next, the wafers travel to the Assembly Area where the wafers will be cut into individual circuits, tested and assembled into packages ready for customer shipping.

There are three basic discharges from the plant which are monitored and reported to the DER and EPA:

1. Non-contact cooling water.
2. Reverse osmosis reject water.
3. Acid waste from the etching and stripping operations.

Solvents and concentrated acid wastes generated at the plant are transported by truck to an approved site for [illegible]

Photographic bleaches, dyes and solvents are transported by truck to an approved site for pressure filtration and disposal.



CONTENTS

POLLUTION INCIDENT PREVENTION PLAN

I - General

A. This plan consists of actions to be taken in the event of an accidental discharge of pollutants. It shall serve as guidelines for personnel directly involved with the prevention and correction of a pollution incident. The plan was developed by Solid State Scientific, Inc. employees knowledgeable in the daily operations of the plant.

II - Plant Design - New or Modified Facilities

A. Attached is a Pollution Incident Report as described in Section 49 of the Pollution Incident Prevention Plan.

B. Past Incidents

1. In March of 1975, an underground solvent tank ruptured. Its contents were pumped out and the tank, with surrounding contaminated soil, were excavated and disposed of at a licensed landfill. To date, this is the only incident known to Solid State Scientific, Inc. that required D.E.R. notification. It is Solid State Scientific's contention that the incident was handled thoroughly and did not have a severe effect on the environment. The measures taken were those recommended by the Department. Solid State Scientific did perform corrective action by installing the new 550 gallon skid mounted tank in

an open pit. This provides the capability for a daily check on the tank's integrity and quick draining and replacement in the event of a leak or rupture.

C. Present and Future Plant Design

1. Diked areas

a. There are two diked areas for hazardous materials for Solid State Scientific. One consists of asphalt berming with a 1,000 gallon retention capability. Though not considered entirely impermeable, this area will retain liquid for the length of time necessary to take corrective action and return operation to normal.

2. Clean-up Materials and Equipment

a. The recommended spill clean-up materials for the waste treatment plant will be provided prior to final completion of the system. The manufacturing area has chemical absorbent for acids, caustics and solvent, lined containers and emergency exhaust back up capability to accomodate a spill incident. In the event a spill is too large for the immediate area personnel to handle, the spill brigade will be dispatched and the area evacuated until the problem is resolved.

3. Floor Drains

a. Solid State Scientific has two sub-floor waste sumps which

List - L-2 (continued)

20. Corporations in the Vicinity:

Solid State Microwave
Bldg. #16
Commerce Drive
Montgomeryville, Pa. 18936
(215) 362-8500
Facility contact: Harry Wister, Larry DeMumbrum

Nation/Ruskin Corporation
Commerce and Enterprise Roads
Montgomeryville, Pa. 18936
(215) 368-6161
Facility contact: Mr. Luantman

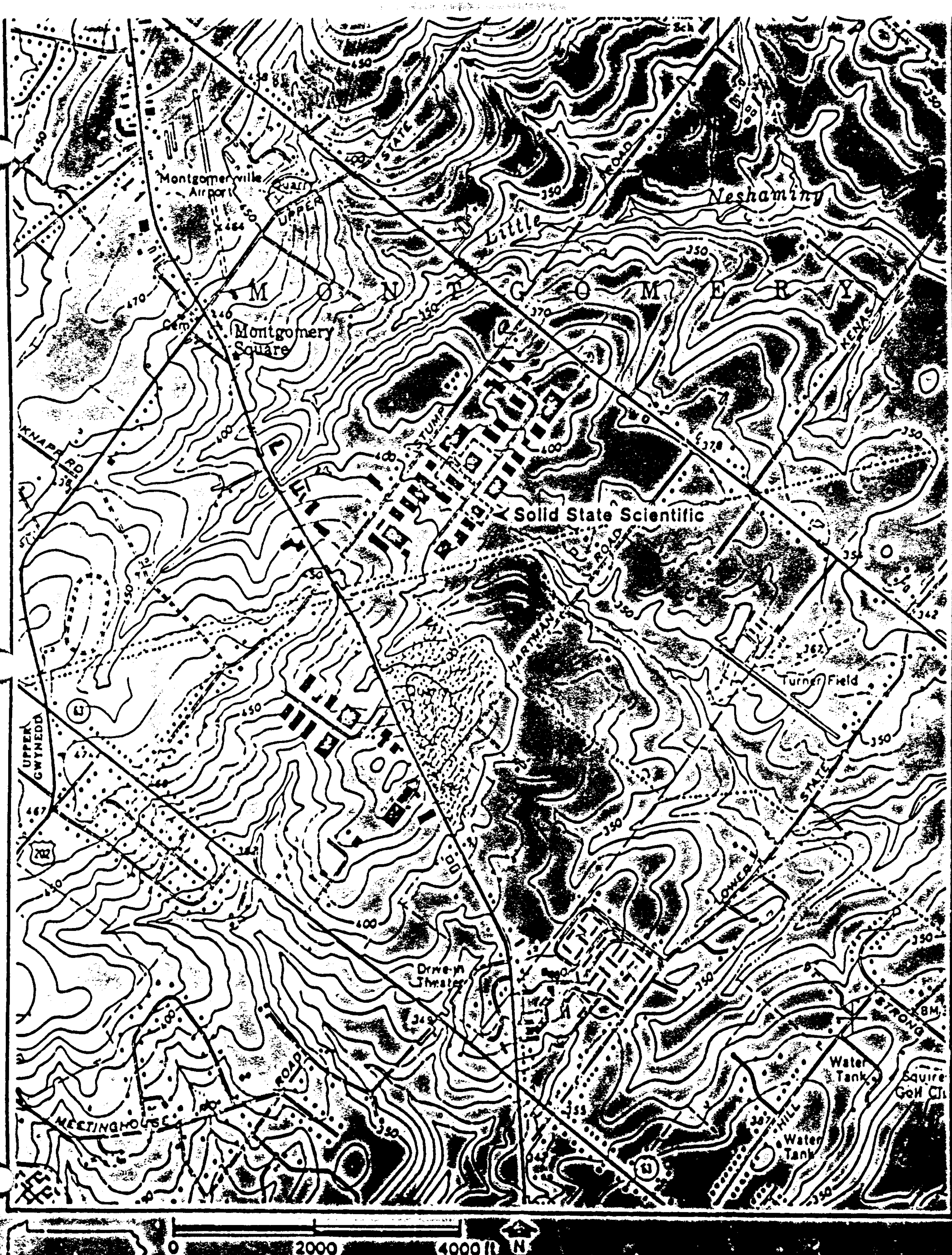
Mid-Atlantic Packaging, Inc.
Stump Road
Montgomeryville, Pa. 18936

(215) 855-5146
Facility contact: Sid Bruce (home phone - 855-8151)
Harry Martin (home phone - 644-1905)

Park Device Manufacturing, Inc.
Commerce Drive
Montgomeryville, Pa. 18936
(215) 368-3821
Facility contact: Ray Lusse (home phone - 884-3881)
Harry Gutekunst (home phone - TU6-2078

Philadelphia Resins Corporation
Commerce Drive
Montgomeryville, Pa. 18936
(215) 855-8450
Facility contact: Joe Williams, Nancy Mis

A.E.L. Emtech
Stump and Enterprise Roads
Montgomeryville, Pa. 18936
(215) 368-2440
Facility contact: Stan Bee, George Schiele



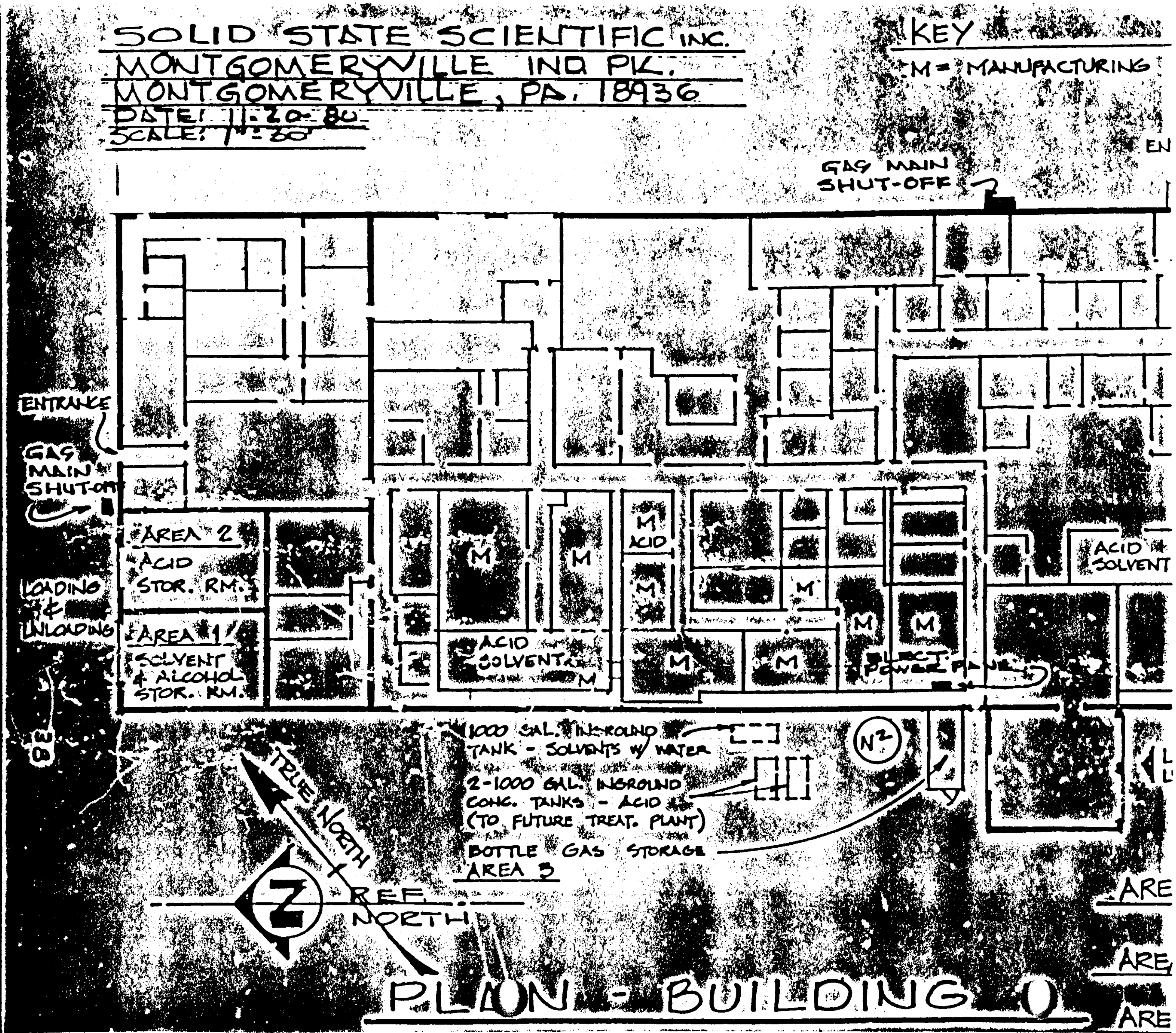
PENNSYLVANIA

QUADRANGLE LOCATION

AMBLER, PA.

Figure 1

Solid State Scientific Location Pla


SOLID STATE SCIENTIFIC INC.
MONTGOMERYVILLE IND. PK.
MONTGOMERYVILLE, PA. 18936
DATE: 11-20-80
SCALE: 1" = 30'
KEY
M = MANUFACTURING
GAS MAIN SHUT-OFF
ENTRANCE
GAS MAIN SHUT-OFF
LOADING & UNLOADING
AREA 2
ACID STOR. RM.
AREA 1
SOLVENT & ALCOHOL STOR. RM.
M
M
M
ACID
M
M
M
ACID SOLVENT
M
M
M
M
M
ELECT. POWER PANEL
ACID SOLVENT
1000 GAL. IN-GROUND TANK - SOLVENTS W/ WATER
N2
2-1000 GAL. INGROUND CONC. TANKS - ACID (TO FUTURE TREAT. PLANT)
BOTTLE GAS STORAGE
AREA 3
TRUE NORTH
REF. NORTH
N
PLAN - BUILDING

POLLUTION INCIDENT PREVENTION PLAN

I - General

A. This plan consists of actions to be taken in the event of an accidental discharge of pollutants. It shall serve as guidelines for personnel directly involved with the prevention and correction of a pollution incident. The plan was developed by Solid State Scientific, Inc. employees knowledgeable in the daily operations of the plant.

II - Plant Design - New or Modified Facilities

A. Attached is a Pollution Incident Report as described in Section 49 of the Pollution Incident Prevention Plan.

B. Past Incidents

1. In March of 1975, an underground solvent tank ruptured. Its contents were pumped out and the tank, with surrounding contaminated soil, were excavated and disposed of at a licensed landfill. To date, this is the only incident known to Solid State Scientific, Inc. that required D.E.R. notification. It is Solid State Scientific's contention that the incident was handled thoroughly and did not have a severe effect on the environment. The measures taken were those recommended by the Department. Solid State Scientific did perform corrective action by installing the new 550 gallon skid mounted tank in

CONTENTS

NOTE: Emergency Personnel Telephone List - see page 20

Photographic bleaches, dyes and solvents are transported by truck to an approved site for pressure filtration and disposal.

NARRATIVE

Solid State Scientific, Inc. is a semiconductor manufacturing house which was established approximately 14 years ago. At S.S.S.I., we manufacture L.S.I. (Large Scale Integrated) circuits. These circuits are basically small electronic brains which will be used in many different applications in electronics such as watches, auto clocks, smoke detectors, computer memories, space and tele-communications, military communications and many more.

The processing of these circuits is a sensitive, complex procedure which requires expert skill and above all an ultra-clean manufacturing environment. The circuits are processed on the surface of a silicon wafer. One wafer will contain as many as 800 individual circuits. The wafers are mass produced in Wafer Fab using photographic techniques, high temperature heat treatments and chemical processing. The wafers then travel on to the Test Area where each circuit on the wafer is tested electrically. Next, the wafers travel to the Assembly Area where the wafers will be cut into individual circuits, tested and assembled into packages ready for customer shipping.

There are three basic discharges from the plant which are monitored and reported to the DER and EPA:

1. Non-contact cooling water.
2. Reverse osmosis reject water.
3. Acid waste from the etching and stripping operations.

Solvents and concentrated acid wastes generated at the plant are transported by truck to an approved site for incineration.

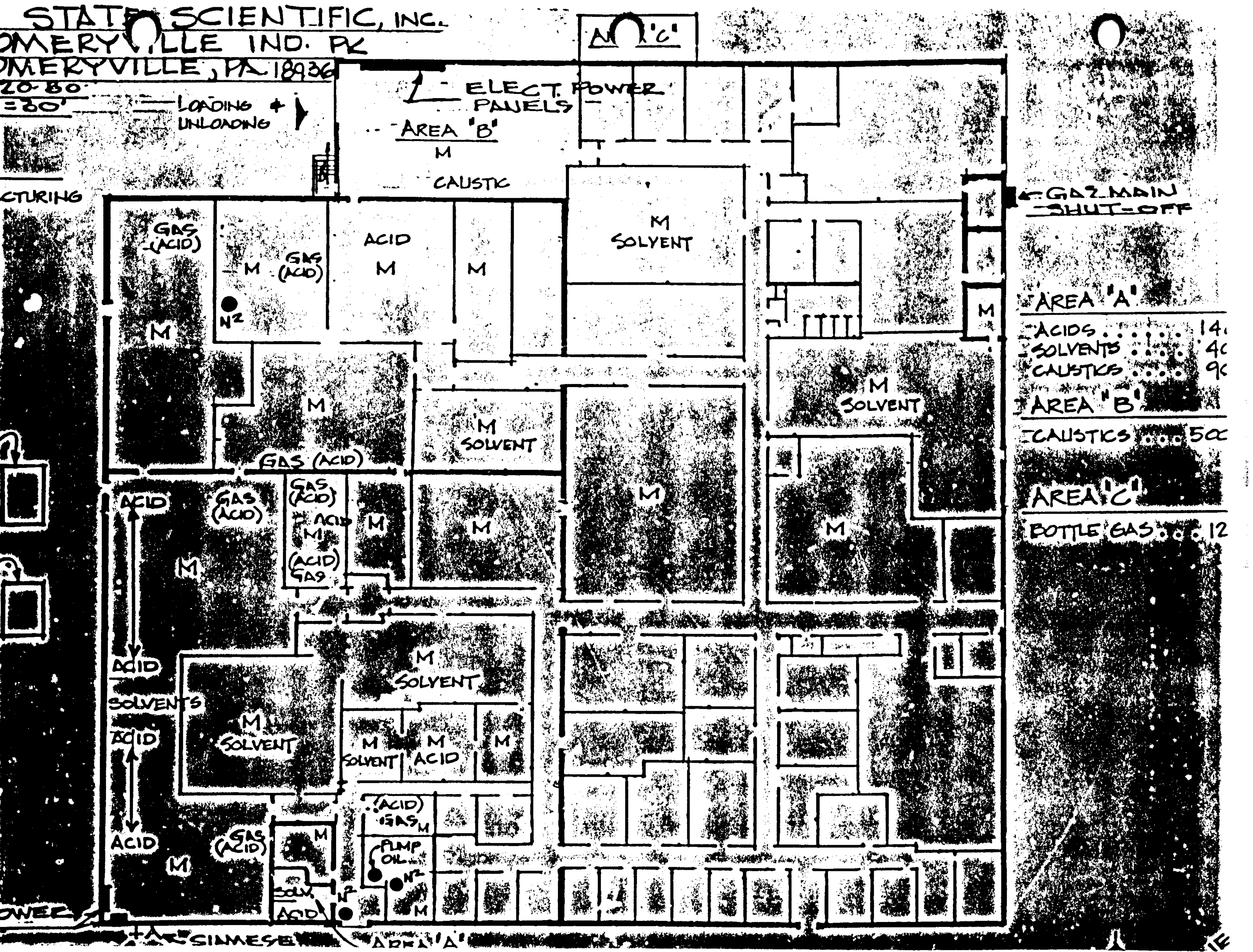
SOLID STATE SCIENTIFIC, INC.

Montgomeryville, Pa.

PREPAREDNESS, PREVENTION, AND CONTINGENCY PLAN

(PPCP)

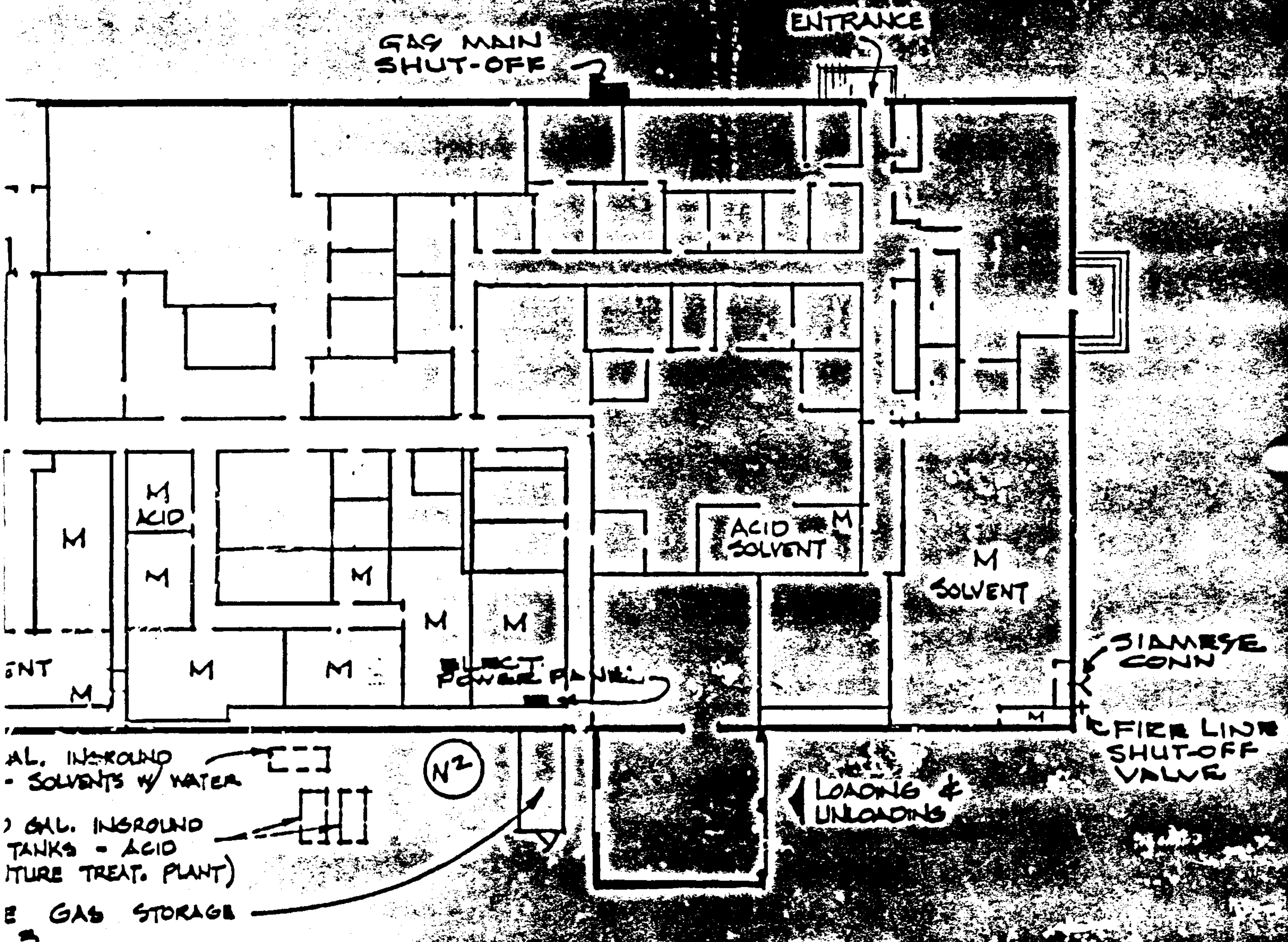
April 10, 1981
May 27, 1981 Rev.
July 21, 1981 Rev.
December, 1981 Rev.



STATE SCIENTIFIC, INC.
OMERYVILLE IND. PK
OMERYVILLE, PA 18936
20-80
=80'
LOADING + UNLOADING
CTURING
ELECT. POWER PANELS
AREA 'B'
M
CAUSTIC
GAS MAIN SHUT-OFF
GAS (ACID)
M
GAS (ACID)
N2
ACID
M
SOLVENT
GAS (ACID)
ACID
SOLVENTS
AREA 'A'
ACIDS ... 14
SOLVENTS ... 40
CAUSTICS ... 90
AREA 'B'
CAUSTICS ... 50
AREA 'C'
BOTTLE GAS ... 12
PUMP OIL
SOLV.
SIAMESE
AREA 'A'

NTIFIC INC.
NO PK.
PA. 18936

KEY
M = MANUFACTURING



AREA 1
SOLVENT . . . . . 3800 GAL.

AREA 2
ACID . . . . . . 3,000 GAL.

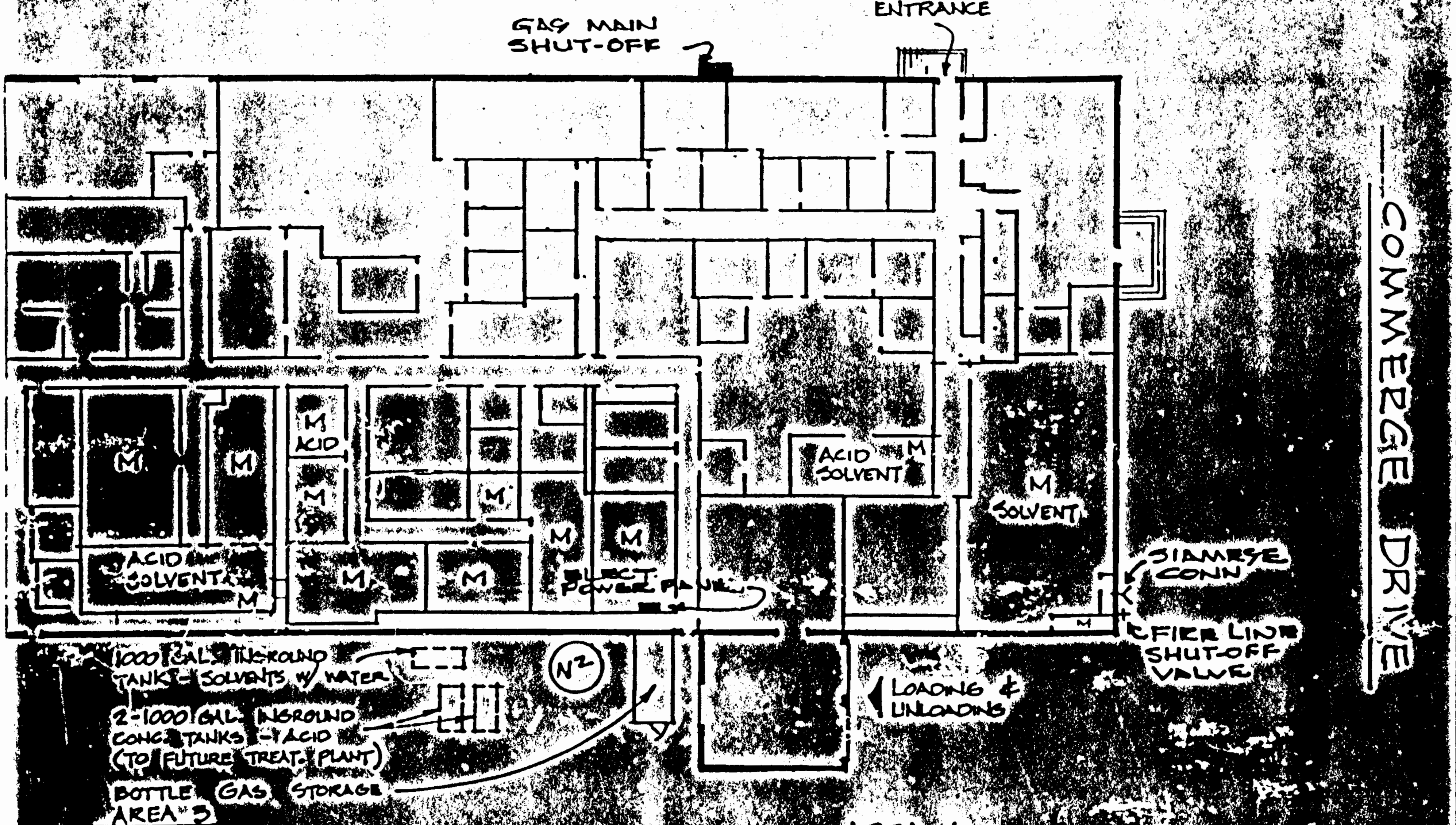
AREA 3
BOTTLE GASES 12 CYL.

N - BUILDING 3

TE SCIENTIFIC INC.
VILLE IND PK.
VILLE, PA. 18936

KEY

M = MANUFACTURING



AREA 1
SOLVENT .... 3800 GAL.

AREA 2
ACID ...... 3,000 GAL.

AREA 3

EF.
ORTH

PLAN - BUILDING

3. April 1976 Wastewater Characterization and Concept Design Report

Provided by: PADEP files

WASTEWATER CHARACTERIZATION
AND
CONCEPT DESIGN REPORT
FOR
SOLID STATE SCIENTIFIC, INC
MONTGOMERYVILLE, PA

APRIL, 1976

B.E.E. PROJECT NO. 00-4800-01

Submitted by: Larry W. Johnson

Larry W. Johnson
Assistant Project Engineer
Concept Design and Operations Dept.

Terrence J. McManus
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Concept Design and Operations Dept.

Reviewed by:

George A. Prior, Ph.D., P.E.
Manager
Concept Design and Operations Dept.

Approved by:

Vernon T. Stack, Jr., P.E.
Vice President
Concept Design and Operations Dept.

TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 General

Solid State Scientific, Inc. of Montgomeryville, Pennsylvania is a semiconductor manufacturer which employs 312 people. The facility, consisting of three buildings located in Montgomeryville Industrial Park, is normally operated on a five days per week, eight hours per day schedule. Two of the buildings process the silicone wafers while the third contains the photo processing operation.

The processes utilize various acids, solvents and photochemicals. Currently, all spent acids and low pH rinse streams are neutralized with sodium carbonate before discharge into a tributary of Park Creek. Used solvents are transported to a neighboring chemical company for reclamation.

City water is treated by a reverse osmosis/ion exchange system in each building. This deionized water is used for all rinses and reagent preparation throughout the processes. The reverse osmosis reject streams are discharged to the receiving stream.

The inadequacy of treatment for the rinse and acid streams from Building No. 2 resulted in a citation by the State of Pennsylvania for low pH and excessive fluoride and phenol concentrations.

1.2 Scope of Work

The purpose of this study is to develop a comprehensive treatment scheme for all liquid wastes generated at Solid State Scientific. All waste streams were sampled and analyzed for appropriate parameters. Flow measurements were recorded and used to quantify the results of the sample analyses.

Following review of the analytical data, a treatability study was conducted on actual waste samples to determine the effectiveness of strong base ion exchange resin as a treatment for fluoride removal. From the results of the waste characterization study and treatability study a conceptual design of appropriate facilities to treat the waste streams was developed.

2.0 PROBLEM DEFINITION

2.1 Pollutant Sources

2.1.1 Building 1

All processes in Building 1 are manual batch operations. The acids used in this building are hydrofluoric, sulfuric, phosphoric and nitric. The spent acids are transported to the underground neutralization tanks outside the building. Following neutralization, the tanks flow into a storm drain which empties into a tributary of Park Creek. Contaminated rinse waters and R.O. reject streams also flow into these tanks. Spent trichloroethylene, acetone, alcohols, xylene and photo solvents are containerized and transported to a nearby chemical company for resale.

2.1.2 Building 2

The manufacturing operation in Building 2 is similar to Building 1 and employs the same acids and solvents as described above. However, one process which utilizes hydrofluoric acid and another which uses a sulfuric acid/hydrogen peroxide solution are automated. Spent hydrofluoric acid is combined with contaminated rinse streams. This combined effluent is then neutralized prior to discharge. Previously, the sulfuric acid discharge was diluted with other rinses and discharged to the stream. However, during the week of April 5, 1976 this discharge was rerouted through a temporary sodium carbonate neutralization tank.

The reverse osmosis/ion exchange system in this building is operated on a 50% reject rate. As such it approximately doubles the concentration of the solids contained in the city water feed. This reject stream is discharged without treatment.

2.1.3 Building 3

The batch operations in Building 3 utilize perchloric and hydrochloric acids and a number of photo chemicals. Contaminated acids and photo chemicals are containerized and stored for off-site disposal. Water rinses utilized to remove residue from the photo tanks are piped to an underground holding tank at the rear of the building. This tank is periodically pumped by an outside contractor for off site disposal.

2.2 Waste Characterization

2.2.1 General

A wastewater characterization survey was conducted at Solid State Scientific, Inc. on December 30, 31, 1975. The sample point numbers and locations are listed below.

001 - R.O. reject stream from Building 2

002 - Building 2 rinse streams and hydrofluoric acid waste from automated wafer etch process

003 - Building 2 diluted waste from automated sulfuric acid/hydrogen peroxide etch process

004 - Building 3 - waste storage tank

005 - Storm drain - downstream from neutralization tanks for Building 1 waste

006 - Storm drain - upstream from neutralization tank discharge for Building 1 waste

2.2.2 Flow Measurement

The flow rate of sample point 001 was calculated from meter readings on the R.O. system. With a product water use of 1500 gallons per day and a constant 50% of feed rejection rate, the reject stream flow is 1500 gallons per day or approximately 1 gpm.

Sample points 002 and 003 were measured by 60 degree V-notch weirs. A weir box was constructed of marine grade 1/2 inch plywood and all seams were sealed with "Duxseal" to prevent leakage. On one side of the box a 60 degree V-notch weir plate was mounted on the plywood. These weir boxes were carefully placed under each discharge pipe and overflow depths were measured by portable Bristol level recorders.

For a 60 degree V-notch weir, depth of flow over the weir crest is related to flow rate by the following relationship:

$$Q = 1.43\ H^{5/2}$$

where:

Q = flow rate in cubic feet per second

H = depth of flow over crest in feet

The flow charts and tabulated results developed during the survey are presented in Appendix A. The results indicate the average flows from discharges 002 and 003 are 1.0 gpm and 0.5 gpm, respectively.

The same procedure as described above was used in the installation of a 30 degree V-notch weir on the inlet to the waste storage tank behind Building 3. For a 30 degree V-notch weir, the depth-flow rate relationship is:

$$Q = 0.66\ H^{5/2}$$

where:

Q = flow rate in cubic feet per second

H = depth of flow over the weir crest in feet.

The flow charts generated during the survey and tabulated results are presented in Appendix A. The average flow rate into the tank was found to be 2.25 gpm.

The overflow from the tanks near Building 1 could not be measured directly. It was anticipated that sampling and recording flow in the storm sewer upstream and downstream from the point of intersection would effectively characterize this discharge. To accomplish this, two eight-inch rectangular weirs were installed in the twenty four inch diameter, concrete storm sewer. The weir plates were constructed of sheet metal and mounted on marine-grade 1/2 inch plywood. The plywood was cut to fit the contour of the pipe. After being wedged into position with one inch by one inch lumber, a water tight seal was formed between weir and pipe with "Duxseal".

The relationship for an eight inch rectangular weir is:

$$Q = 3.33\ (8/12 - 0.2H)H^{3/2}$$

where:

Q = flow rate in cubic feet per second

H = depth of flow over the crest in feet.

Flow charts from these two weirs are presented in Appendix A. The results indicate the difference in flow between the two points as:

December 29 & 30, 1975	17.6 gpm
January 14 & 15, 1975	16.8 gpm
January 15 & 16, 1976	17.2 gpm

These calculated flow differences were well over the expected flow from Building 1. Upon close examination of the flow charts it was discovered that a cyclic change in head was recorded on each chart. It is theorized that this regular variation is the result of a sump pump discharge from an upstream neighbor of Solid State's. Because of the inconsistencies in the flow data, the design flow rates for rinse water treatment were estimated to be the same as those in Building 2.

2.2.3 Sampling and Analytical Procedures

Sampling of all discharges for laboratory analysis was conducted on December 30 and 31, 1975. At each discharge, grab samples were collected manually at one-half-hour intervals and composited. The sampling periods coincided with the 8:00 AM to 4:00 PM work shift. The pH of each discharge was recorded at one-half-hour intervals. Samples were appropriately preserved and transported to B.E.E.'s laboratory in Norristown, Pennsulvania for analysis. All analyses were performed in accordance with procedures currently accepted by the United States Environmental Protection Agency.

2.2.4 Discussion of Results

Results of the laboratory evaluation of samples collected during the survey and on site pH measurements are presented in Tables 1 through 4 on pages 8 through 11.

2.2.4.1 Sample Point 001

The R.O. reject stream exhibited a moderately high dissolved solids and hardness content, but should be acceptable for discharge without treatment. The high alkalinity of this effluent lends itself as an effective neutralization source for dilute rinse streams.

Table 1

Solid State Scientific, Inc.
Montgomeryville, PA

RESULTS OF SAMPLE ANALYSIS

12/16/75

Parameter	002	003	Upstream	Downstream
pH	3.4	2.5	6.4	6.3
Acidity (to pH 4.5)	132	149	-	-
Acidity (to pH 8.3)	250	161	-	-

12/17/75

	Pond Inlet	001	002	003	Down-Stream
pH	6.4	6.5	3.5	0.2	2.5
Alkalinity	111	90	-	-	-
Acidity (to pH 4.5)	-	-	43	-	-
Acidity (to pH 8.3)	-	-	105	-	-
Total Solids	-	522	-	-	-

BETZ ENVIRONMENTAL ENGINEERS, INC.

TABLE 2

Solid State Scientific, Inc

Montgomeryville, Pa.

RESULTS OF SAMPLE ANALYSIS

Dec. 30, 1975 1:15pm-4:15pm Grab Composites

Sampling Point

Shown on Table 4

Parameter[1]	001	002	003	004
pH units	6.8			
Color Pt-Co Units	0			
Acidity(as$CaCO_3$)		116	97,000	
Alkalinity(as$CaCO_3$)	210			92
Hardness(as$CaCO_3$)	298			
Calcium(as$CaCO_3$)	184			
Magnesium(as$CaCO_3$)	114			
Total Solids	528	263	98,955	1,826
Dissolved Solids	518	258	98,946	1813
Suspended Solids	10	5	9	13
Chloride	109	4.5	47	
Fluoride		42.52	0.57	0.10
Sodium	19			
Sulfate(asSO_4)	70	98	50,500	
Aluminum		1.0	0.2	
Chromium, Hexavalent		<0.05	<0.05	
Chromium, Trivalent		<0.05	<0.05	
Iron	0.1			
Nickel		<0.01	0.07	
Silver				0.09
Cyanide				<0.005
Phenol		1.06	<0.004	0.104
BOD		14	*	250
COD		27	405	600
Nitrate		0.46	4.0	
Total Phosphorus(asP)		6.4	0.04	

High acid [illegible]

Organic load

1 All units are mg/l unless otherwise designated

* Interference

TABLE 3

Solid State Scientific, Inc

Montgomeryville, Pa.

RESULTS OF SAMPLE ANALYSIS

Dec. 31, 1975 8:35am–2:15pm Grab Composites

downstream upstream

Sampling Point

Parameter[1]	001	002	003	004	005	006
pH units	6.6	2.1	1.6	8.2	7	7.2
Color Pt-Co Units	5					
Acidity(as$CaCO_3$)		272	2,500		67.5	6
Alkalinity(as$CaCO_3$)	120			500	95	115
Hardness(as$CaCO_3$)	358					
Calcium(as$CaCO_3$)	174	14				
Magnesium(as$CaCO_3$)	184					
Total Solids	572	371	4,095	1,523	295	227
Dissolved Solids	544	351	4,065	1,479	235	189
Suspended Solids	28	20	30	44	60	38
Chloride	156	3	4		82	24.5
Fluoride		55.06	0.10	2.34	43.08	2.33
Sodium	18					
Sulfate (asSO_4)	83	172	2,900		83	52
Aluminum		1.0	<0.1		1.3	0.5
Chromium, Hexavalent		<0.005	<0.005		<0.005	<0.005
Chromium, Trivalent		<0.005	<0.005		<0.005	<0.005
Iron	0.1					
Nickel		<0.01	0.03		0.01	0.03
Silver				0.05		
Cyanide				<0.005		
Phenol		<0.004	0.008	0.076	<0.004	<0.004
BOD		8	*	125	15	<4
COD		50	225	430	22	33
Nitrate		3.70	8.50		1.70	0.82
Total Phosphorus(asP)		4.98	0.12		3.72	0.55
Silica		5	<1			
Specific Conductance (Micro-ohms)		572	17,030			

BETZ ENVIRONMENTAL ENGINEERS INC

1 All units are mg/l unless otherwise designated

* Interference

Table 4

Solid State Scientific, Inc.
Montgomeryville, PA

ON SITE pH MEASUREMENTS

Point 001 OK — Point 002 Too low — Point 003 Too low — Point 004 OK

December 30, 1975

Point 001 Time	pH	Point 002 Time	pH	Point 003 Time	pH	Point 004 Time	pH
1:15 PM	6.7	1:15 PM	4.3	1:15 PM	No Flow	1:20 PM	7.7
2:00 PM	6.9	2:00 PM	4.6	2:00 PM	2.9	2:10 PM	7.7
2:45 PM	6.9	2:45 PM	4.4	2:45 PM	3.0	2:50 PM	7.8
3:15 PM	6.9	3:15 PM	4.1	3:15 PM	1.1	3:25 PM	7.8
3:45 PM	7.0	3:45 PM	3.2	3:45 PM	2.1	3:55 PM	7.6
4:15 PM	7.6	4:15 PM	3.6	4:15 PM	2.6		

December 31, 1975

Point 001 Time	pH	Point 002 Time	pH	Point 003 Time	pH	Point 004 Time	pH
8:35 AM	5.8	8:35 AM	3.1	8:35 AM	2.5	8:30 AM	8.5
9:15 AM	6.2	9:15 AM	3.7	9:15 AM	2.2	9:15 AM	8.4
9:45 AM	6.2	9:45 AM	3.5	9:45 AM	2.3	9:45 AM	8.1
10:15 AM	6.2	10:15 AM	3.2	10:15 AM	2.0	10:15 AM	8.2
10:45 AM	6.1	10:45 AM	3.5	10:45 AM	3.1	10:45 AM	8.2
11:15 AM	6.1	11:15 AM	4.1	11:15 AM	<2	11:15 AM	8.3
11:45 AM	6.1	11:45 AM	4.0	11:45 AM	2.0	11:45 AM	8.5
12:15 PM	6.0	12:15 PM	2.9	12:15 PM	2.0	12:15 PM	8.5
12:45 PM	6.2	12:45 PM	2.5	12:45 PM	No Flow	12:45 PM	8.5
1:15 PM	6.2	1:15 PM	3.2	1:15 PM	No Flow	1:15 PM	8.5
1:45 PM	6.0	1:45 PM	3.4	1:45 PM	2.0	1:45 PM	8.4
2:15 PM	6.7	2:15 PM	2.6	2:15 PM	<2	2:15 PM	8.2

Fluorides
low pH
BOD
Phenol
Ammonia?

2.2.4.2 Sample Point 002

This Building 2 rinse stream is characterized by extremely high fluoride concentrations and low pH. This indicates that the marble chip neutralization tank was ineffective in treating this waste at the time it was sampled. According to Solid State Scientific personnel, a modification of this neutralization tank has been effective in raising the pH of the waste to levels above 6.0 pH units. Furthermore modifications have been made to contain the concentrated hydrofluoric acid waste for off site disposal.

See p.3

Phenol concentrations as high as 14 mg/l were found in certain grab samples from this discharge. To rectify this situation, Solid State Scientific management instituted new procedures to prevent future slug discharges of the concentrated photo strip solution. Does this mean there are future phenol discharges.

2.2.4.3 Sample Point 003

This discharge contains extremely high dissolved solids, sulfate and has a very low pH. Subsequent to the sampling program, Solid State Scientific personnel installed a temporary neutralization system to control the pH of this waste prior to discharge. Neutralization alone will have a deleterious effect upon the solids concentrations in the discharge, and current plans include the elimination of the concentrated acid from this discharge.

Also - organic levels (see sampling) photo chemicals.

Good

? dissolved solids (sulfate)
low pH
COD

Total solids
phenols
BOD/COD
S.S. F

2.2.4.4 **Sample Point 004**

The holding tank at the rear of Building 3 is periodically emptied and trucked for off-site disposal. This waste was characterized by B.E.E. in order to incorporate this waste in the total waste treatment scheme for the plant. Objectionable characteristics of this waste include dissolved solids, B.O.D. and C.O.D. These values indicate high strength organics from the photo chemicals are entering this discharge. Modification of existing plumbing to exclude concentrated solutions from this waste should preclude the necessity for biological treatment.

2.2.4.5 Building 1 Waste

S.S., BOD, pH

As with discharge number 002, this waste exhibits a high concentration of fluoride. The increase in fluoride concentratons between points 006 and 005 indicates the intersection of the tank overflow and the storm drainage system is between these two sample points. The presence of fluoride in point 006 samples indicates another source of contamination upstream of this point. Upon closer inspection a small discharge was discovered upstream of 006 by B.E.E. and Solid State Scientific personnel. This flow was traced to a lapping machine located in Building 1. Normally, this discharge is pumped to the tanks along with other waste from this building. However, due to an equipment malfunction this flow was re-routed to avoid flooding within the building. It is speculated that this could be the fluoride source in samples taken

Reroute?

at point 006.

2.2.5 Treatability Study

Following examination of the sample analyses, a treatability study was undertaken to determine the effectiveness of a strong base anion exchange resin in the chloride form for fluoride removal.

Ten gallons of waste from discharge 002 was collected for the study. This waste was "spiked" to different fluoride concentrations for each of three runs. A single bed ion exchange column was assembled using a glass tube four-feet long by 7/8 inch diameter. A salt/caustic solution was used for regeneration between runs. Effluent fluoride concentrations were measured at fifteen minute intervals with a "Hach" test apparatus. Samples were also submitted to the B.E.E. laboratory as a check.

Results of the study are summarized in the table below:

	Feed Fluoride Concentration (mg/l)	Volume Treated (l)	Resin Capacity (grains/ft^3)
Run 1	304.0	2.36	1227.4
Run 2	117.8	5.3	1188.2
Run 3	98.8	5.3	952.9

These capacity figures were judged to be too low for full-scale economical fluoride treatment. It is speculated that competing ions in the waste interfere with the adsorption capacity of the single-stage system. Consequently, a twostage cation-anion deionization unit was chosen to more effectively handle the combined rinse streams.

2.2.6 Water Quality Criteria

Water quality criteria have been established by the Department of Environmental Resources to be used as guidelines for discharge permits. Pertinent criteria are presented here for ease of discussion.

The discharges from Solid State Scientific flow into a tributary to Park Creek. This stream flows into the Neshaminy Creek which is used as a drinking water supply downstream. Dissolved solids limits in the Neshaminy are set at 500 mg/l for a monthly average, with a maximum of 750 mg/l. The allowable pH range is 6.0 to 8.5 pH units.

Phenol at concentrations greater than 0.001 mg/l imparts an unpleasant odor and taste to drinking water. For this reason it is restricted to very low levels in wastewater discharges.

Around 1930 it was shown that fluoride in water affects bone and tooth structure. Since then much research has been done on this subject. Fluoride is used in some water supplies at concentrations of 1 mg/l to prevent tooth decay. However, concentrations greater than this have detrimental effects on human health. It has also been shown to form strong complexes with aluminum, beryllium and iron. Due to these findings, fluoride is limited to low concentrations in wastewater discharges.

3.0 PROCESS DESIGN

3.1 Rinse Water Deionization and Fluoride Removal

Ion exchange is recommended as the most effective means of removing fluoride from the rinse streams in Buildings 1 & 2. This type of treatment has the advantage of producing high quality effluent which can be reused as process water. Two alternative designs are offered for consideration.

The first alternative is based upon the rental of the ion exchange columns and subsequent off-site regeneration by the supplier. A system may be used in each of the two buildings, or alternatively, wastes can be pumped to a centrally located single system.

In the event that column rental is not available, the second design provides for on-site column regeneration and regenerant disposal. This system can be purchased as a skid-mounted package unit from one of several vendors. A holding tank for rinse waters is necessary to provide a constant feed rate for the system as well as to contain the rinse flows during the regeneration steps. Feed pumps to develop the pressure needed through the columns are also required.

The effluent from the system chosen will be fed to the existing R.O. system. This will result in a reduced overall water usage as well as a reduced solids level in the R.O. reject streams.

Drawing No. 1 is a flow diagram for the process rinse treatment system with on-site regeneration. Parameters used for the design of the ion exchange system are listed below:

Total Dissolved Solids - 260 mg/l

Maximum Flow Rate - 8 gpm

Type - Two bed deionization with strong acid cation and weak base anion resins

Regenerant: 5 lb NaOH/ft^3 Anion resin

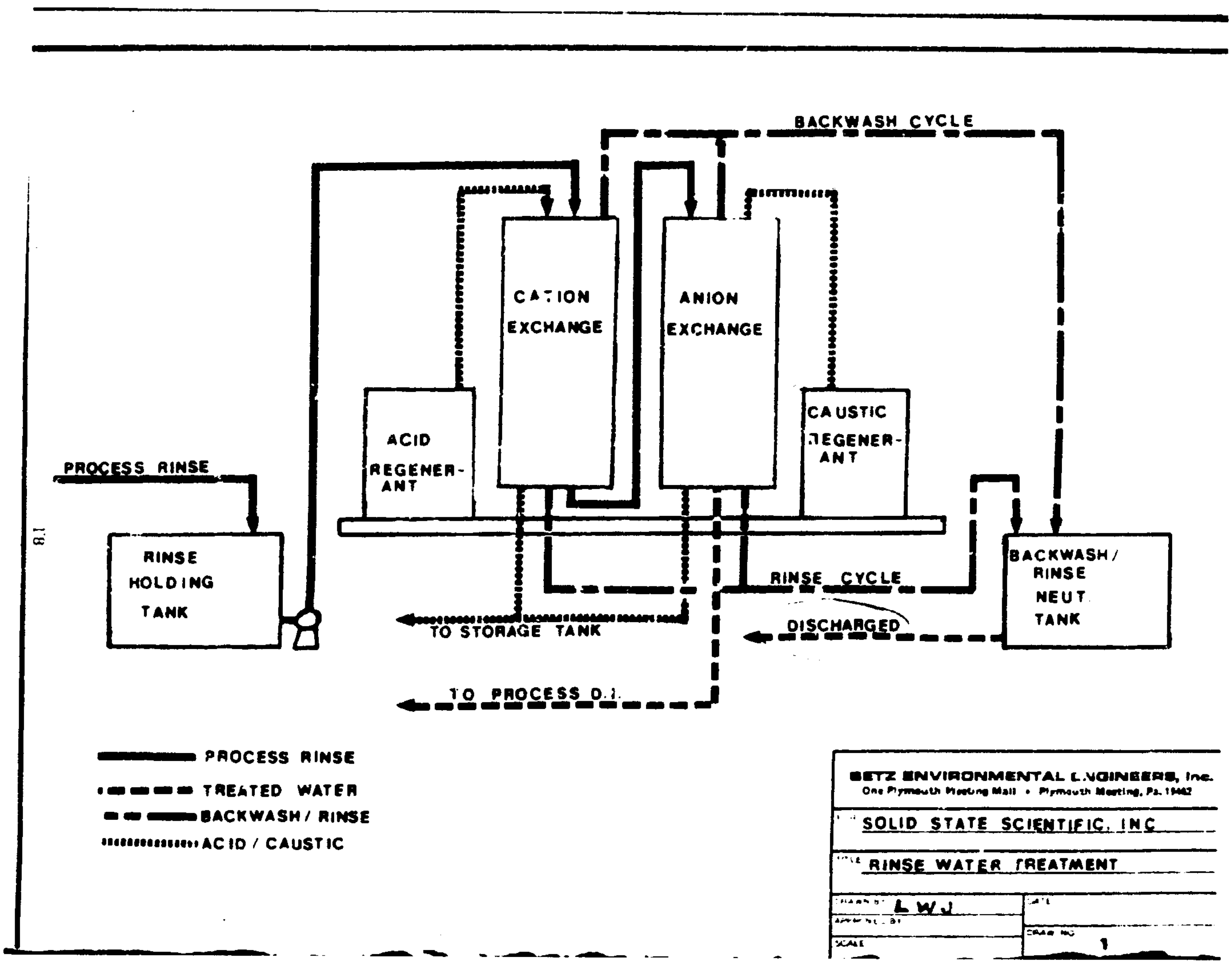
4 lb HCl/ft^3 Cation resin

Unit Size: Each column 16 in. diameter by 66" side height.

Unit Capacity: 6000 gallons treated per regeneration with 5 ft^3 cation resin & 4 ft^3 anion resin.

The following table summarizes the required regeneration solutions, volumes and rates:

Step	Cation Time (Min.)	Cation Rate (gpm)	Cation Volume (Gal)	Anion Time (Min.)	Anion Rate (gpm)	Anion Volume (Gal)
Backwash	10	10	100	10	5	50
8% HCl/8% NaOH	30	1.0	30	30	0.9	27
Displacement	50	0.8	40	55	0.8	44
Rinse	30	8	240	30	8	240
Totals	120		410	125		361

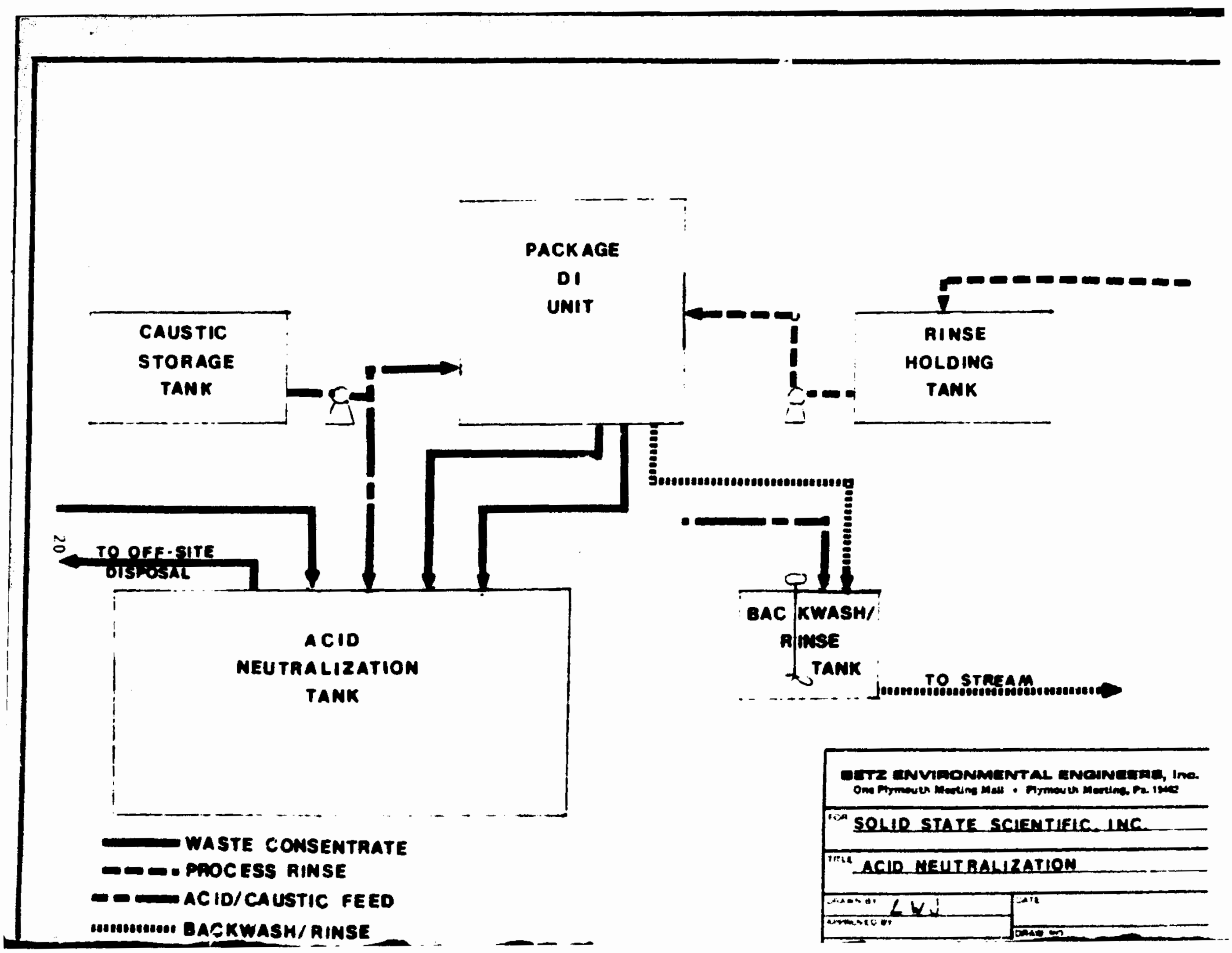

BACKWASH CYCLE
CATION EXCHANGE
ANION EXCHANGE
ACID REGENERANT
CAUSTIC REGENERANT
PROCESS RINSE
RINSE HOLDING TANK
BACKWASH / RINSE NEUT. TANK
RINSE CYCLE
TO STORAGE TANK
DISCHARGED
TO PROCESS D.I.
PROCESS RINSE
TREATED WATER
BACKWASH / RINSE
ACID / CAUSTIC
BETZ ENVIRONMENTAL ENGINEERS, Inc.
One Plymouth Meeting Mall • Plymouth Meeting, Pa. 19462
SOLID STATE SCIENTIFIC, INC
RINSE WATER TREATMENT
LWJ
1

3.2 Concentrated Acid Neutralization

It is proposed that all concentrated acids be pumped or otherwise transported to a single storage tank. D.I. regenerants, if applicable, will also be pumped to this tank. When the tank has accumulated sufficient volume, an outside contractor will remove the contents for off-site disposal. where Provision for neutralization with 50% caustic has been included in the concept design. This was done to enable Solid State Scientific management to weigh the cost of on-site neutralization against charges levied by the hauler for off-site neutralization. Caustic feed was chosen over lime to preclude sludge handling problems from the formation of insoluble calcium fluoride and calcium sulfate. Bulk purchase of caustic should also prove more economical than sodium carbonate or sodium bi-carbonate.

Drawing No. 2 is a diagram of the proposed acid storage-neutralization system. A 5000 gallon tank was chosen for acid storage and neutralization. This size was selected to eliminate the extra charge normally levied by the hauler for pickup of volumes less than the capacity of the tanker.

Similarly a 2000 gallon tank was chosen for caustic storage. Most suppliers require a minimum bulk delivery of 1000 gallons. The extra capacity serves as a reserve between deliveries.


PACKAGE
DI
UNIT
CAUSTIC
STORAGE
TANK
RINSE
HOLDING
TANK
TO OFF-SITE
DISPOSAL
ACID
NEUTRALIZATION
TANK
BACKWASH/
RINSE
TANK
TO STREAM
WASTE CONSENTRATE
PROCESS RINSE
ACID/CAUSTIC FEED
BACKWASH/RINSE
BETZ ENVIRONMENTAL ENGINEERS, Inc.
One Plymouth Meeting Mall • Plymouth Meeting, Pa. 19462
FOR SOLID STATE SCIENTIFIC, INC.
TITLE ACID NEUTRALIZATION
DRAWN BY LWJ
DATE
APPROVED BY
DRAW. NO.

Both tank sizes are arbitrary and may be reduced if extra charges by the hauler and/or supplier are more economical in the opinion of Solid State.

3.3 Neutralization of Backwash and Rinse From DI Unit

If on-site regeneration of the wastewater deionization system is required, treatment of the backwash and rinse waters will also be necessary. Two treatment alternatives are offered for selection on an economic basis.

3.3.1 Alternative 1

Backwash and rinse waters may be routed to the proposed acid storage-neutralization tank for off site disposal. The volume of water involved in backwashing and rinsing both columns is 630 gallons per regeneration. With a unit capacity of 6000 gallons of rinse waste treated per regeneration and at the current usage of 1500 gallons per day in each of two buildings, this represents a volume of approximately 1575 gallons per week. Depending upon hauling costs, this may or may not be economically feasible.

3.3.2 Alternative 2

If the economics of hauling the large volume of a relatively dilute waste proves unattractive, a second neutralization tank is proposed to handle the backwash and rinse water. An 800-gallon batch neutralization tank is envisioned for this purpose.

All backwash and rinse waters will flow into the tank and be manually neutralized by the operator prior to discharge to the stream. A tank size of 800 gallons was chosen to allow for some reserve capacity. This proposed modification is included on Drawing No. 2.

3.4 Economic Analyses

This section presents itemized capital and operating cost estimates for the two alternatives. To facilitate economic comparison with the quote from Continental, annual cost values were also computed.

A prefab building is included to provide shelter for the proposed ion exchange unit. This structure may be required if sufficient space is not available within an existing building. Table 1 lists the capital costs for the ion exchange system. It should be noted that the 5000-gallon neutralization tank is required for all proposed treatment systems to hold the neutralized acid concentrates for hauling.

TABLE 1

CAPITAL COST FOR TREATMENT SYSTEM

A.	Neutralization Tank (5000 gallon)	12,000
B.	Caustic Storage Tank (2000 gallon) with feed pump	9,300
C.	Ion Exchange System	14,000
D.	Process Rinse Holding Tank & Pump	5,500
E.	Backwash/Rinse neutralization System	3,700
F.	Two Pumping Stations for Process Rinses	10,500
G.	Piping	22,000
H.	Instrumentation	3,000
I.	Electrical	10,000
	Subtotal	$90,000

TABLE 1 (Cont'd)

Subtotal	$90,000
Contingency 25%	22,500
Total	$112,500

Extra

1. Prefab Building (20' x 20')	$15,000

Annual operating costs for both alternative appear in Table 2. The following assumptions were made:

a. 3000 gallons of process rinse per day.

b. System capacity of 6000 gallons treated per regeneration.

c. Plant operation 5 days per week, 52 weeks per year.

d. 4 man-hours required per regeneration and 1 man-hour for each neutralization step.

e. Bulk waste hauling costs $0.15 per gallon.

f. Interest rate 10%.

g. Treatment equipment has a 20-year life with no salvage value.

The volume of concentrated acids generated at Solid State and the chemical costs and labor requirements to neutralize the acids are constant for all alternatives, therefore, these costs were not included. Alternative I equipment includes all of the listed equipment except the Backwash/Rinse neutralization tank. Alternative II represents additional costs for the Backwash/Rinse neutralization tank and manpower for neutralization. A savings is realized in hauling costs due to the lower waste volume.

TABLE 2

ANNUAL OPERATING COSTS

		Alternative I	Alternative II
A.	Capital Recovery	12,800	13,200
B.	Labor	7,800	9,100
C.	Chemicals for Regeneration	270	270
D.	Hauling Fees	15,000	7,500
	Total	$35,870	$30,070

Extra

Capital Recovery-Pre Fab Building $1,762

4.0 CONCLUSIONS

a. Production of semi-conductors at Solid State Scientific, Inc. of Montgomeryville, Pa. generates several small wastewater discharges having low pH and high fluoride content.

b. The current treatment of the wastes generated are inadequate to meet State guidelines for discharge.

c. On the basis of characterization survey results, the primary treatment needs are fluoride removal and acid disposal.

d. A treatment scheme was developed and shown schematically.

Treatment includes:

- Rinse water deionization

O.K. - Neutralization for off-site disposal of concentrated acids.

Characterize - Neutralization of backwash and rinse waters from proposed deionization unit.

e. In the opinion of B.E.E. each of the alternatives offered are suitable for effective treatment of the wastewaters generated.

5.0 RECOMMENDATIONS

a. It is recommended that Solid State Scientific negotiate an agreement with a water conditioning supplier for rental of an ion exchange system for rinse water deionization. Alternatively Solid State Scientific may elect to have an ion exchange unit installed and regenerate the resins on-site.

A rented no discharge?

b. A certified waste hauler should be contracted to transport the acid wastes for off-site disposal. It should be pointed out that the ultimate responsibility for legal disposal of waste lies with the industry and not the hauler.

Good point

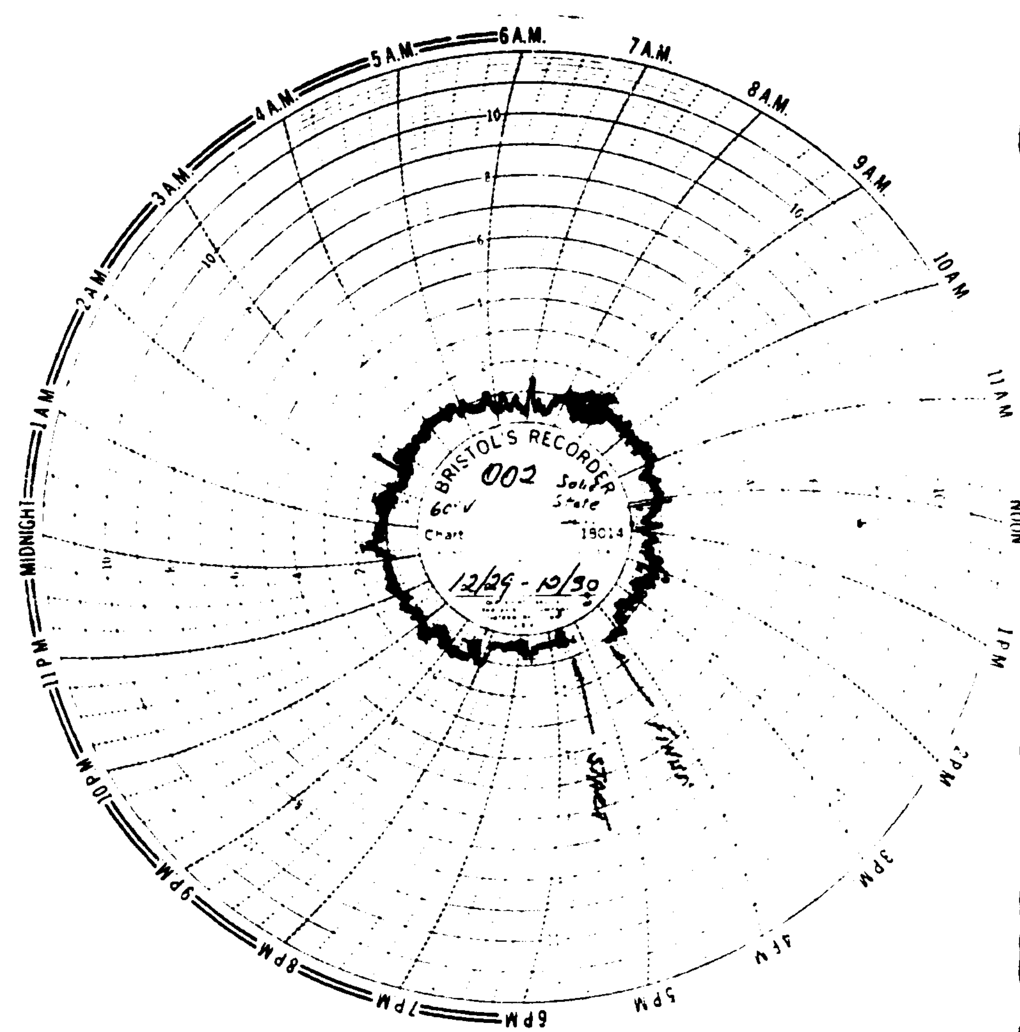
c. Solid State Scientific management should select among the treatment alternatives offered in this report and authorize B.E.E. to proceed with the engineering design phase of the project.

d. During subsequent design and construction phases, it is recommended that an interim agreement for discharge be negotiated between Solid State Scientific, Inc. and the Department of Environmental Resources.

APPENDIX A

Sample Point Flow Rates

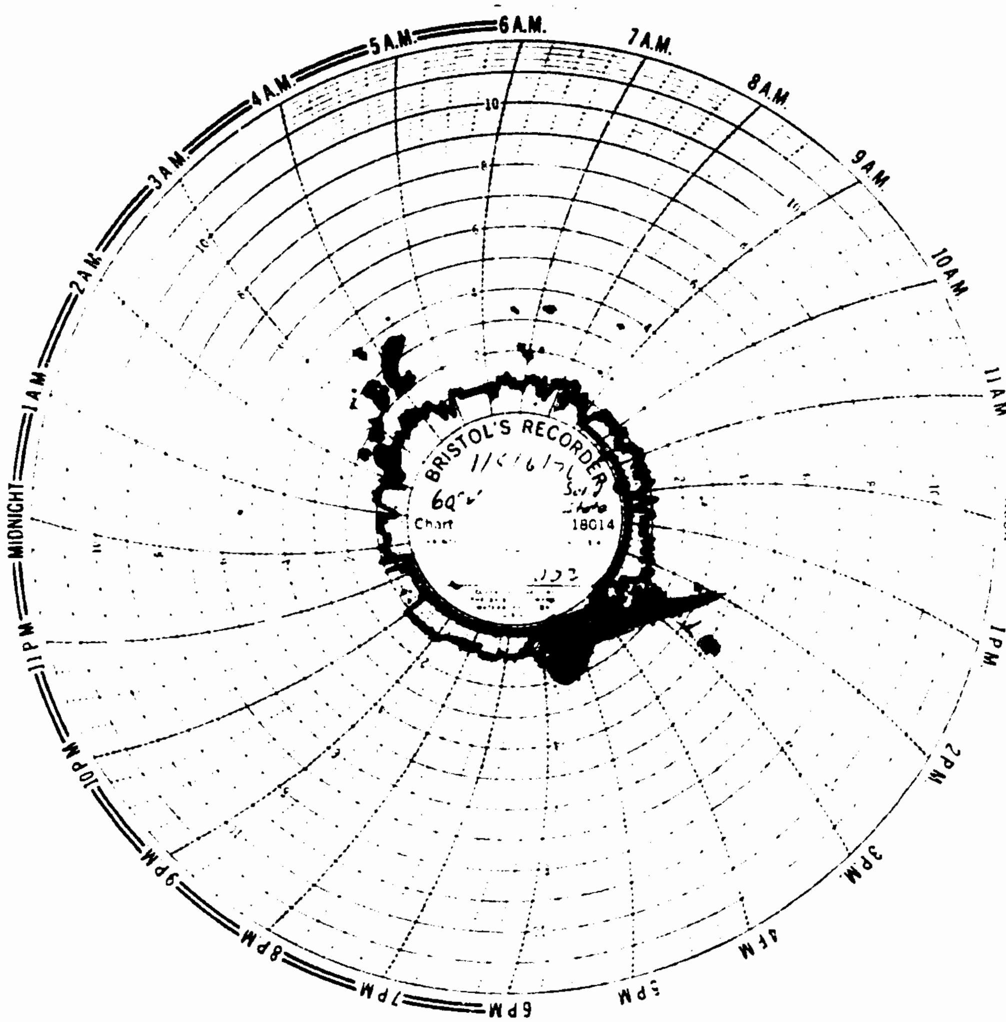
Date	Sample Point	Flow (gpm)
12-29-75 to 12-30-75	002	1.22
12-30-75 to 12-31-75	002	1.18
1-5-76 to 1-6-76	002	1.20
1-6-76 to 1-7-76	002	0.73
12-29-75 to 12-30-75	003	0.60
12-30-75 to 12-31-75	003	0.80
1-14-76	003	0.35
1-15-76	003	0.36
1-16-76	003	0.33
12-29-76 to 12-30-76	004	2.3
12-30-76 to 12-31-76	004	2.2
12-30-76 to 12-31-76	005	31.3
1-14-76 to 1-15-76	005	35.9
1-15-76 to 1-16-76	005	29.6
12-30-75 to 12-31-75	006	13.7
1-14-76 to 1-15-76	006	16.8
1-15-76 to 1-16-76	006	17.2



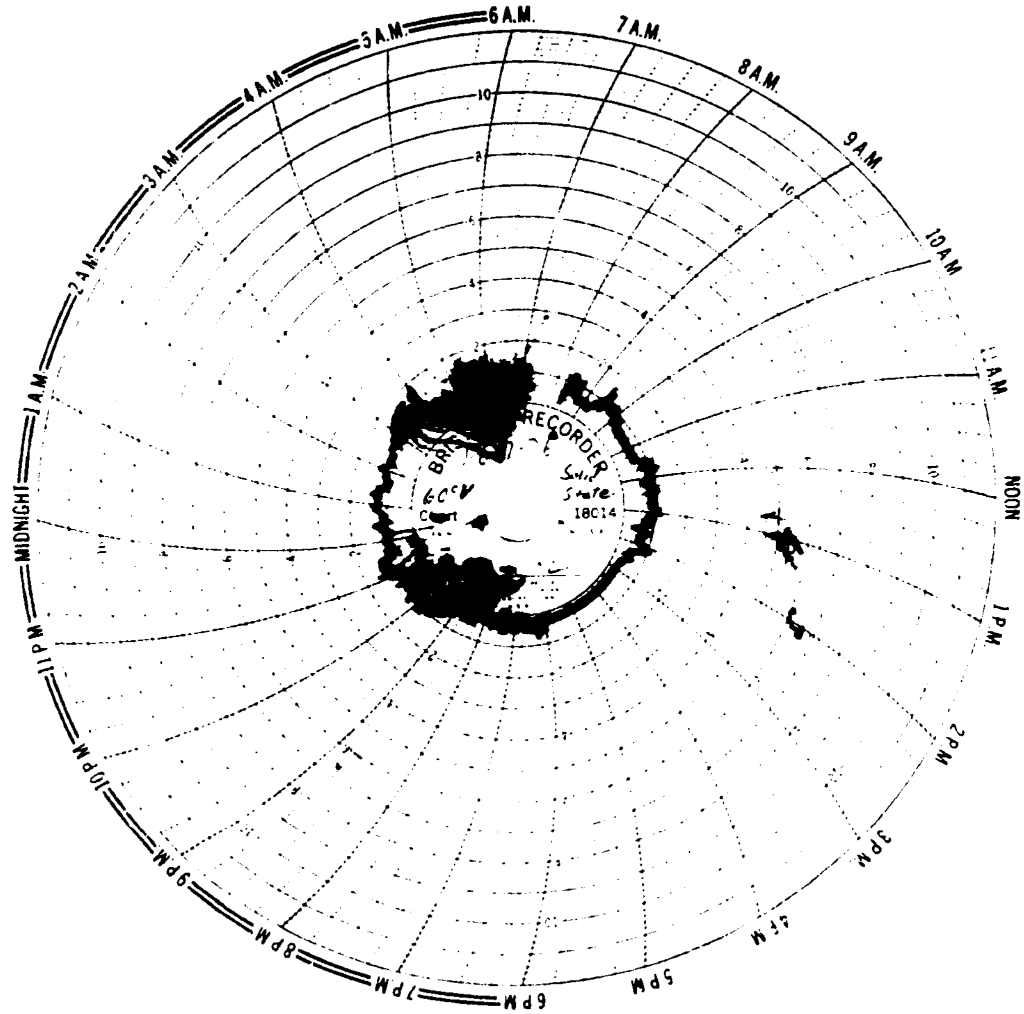
Discharge 002

60° V-Notch Weir

12/29/75 & 12/30/75



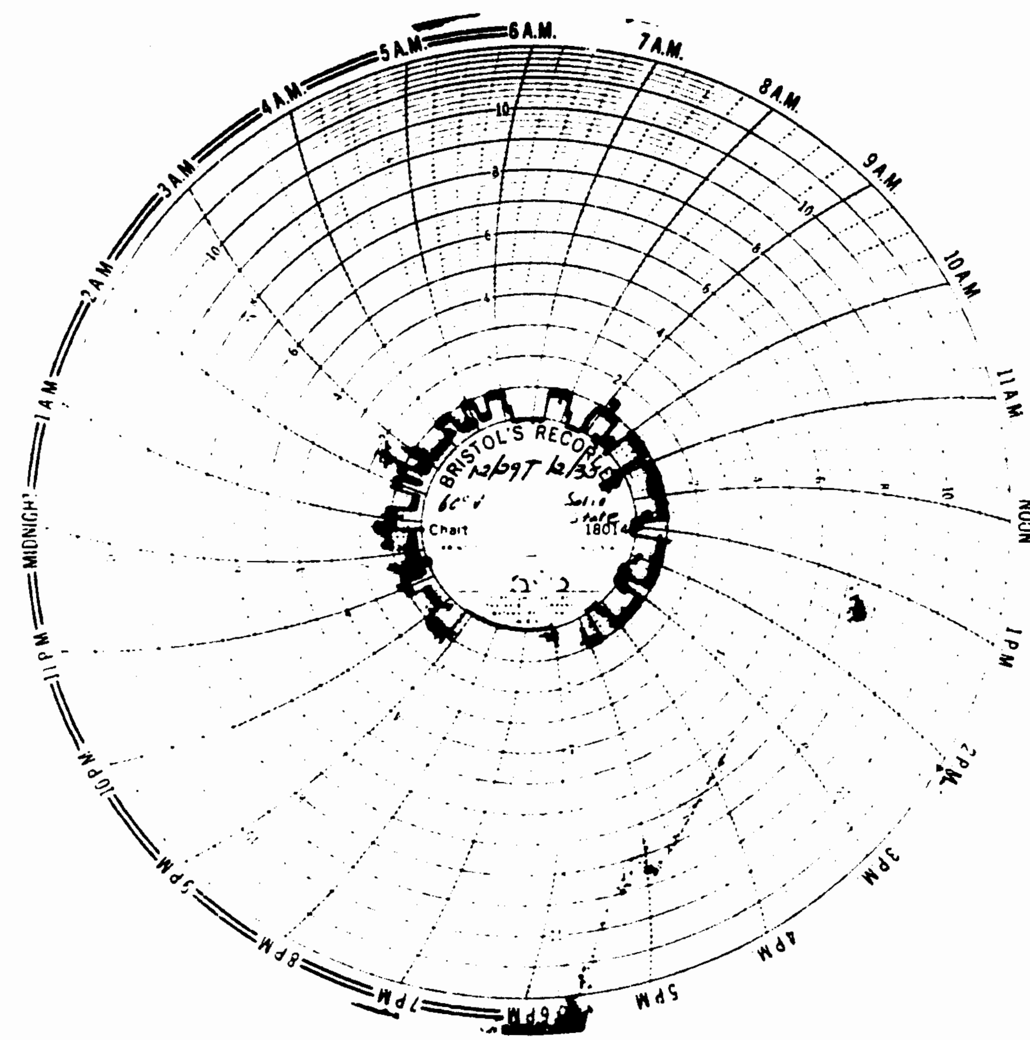
Discharge 002
60° V-Notch Weir
11/5/76 & 11/6/76



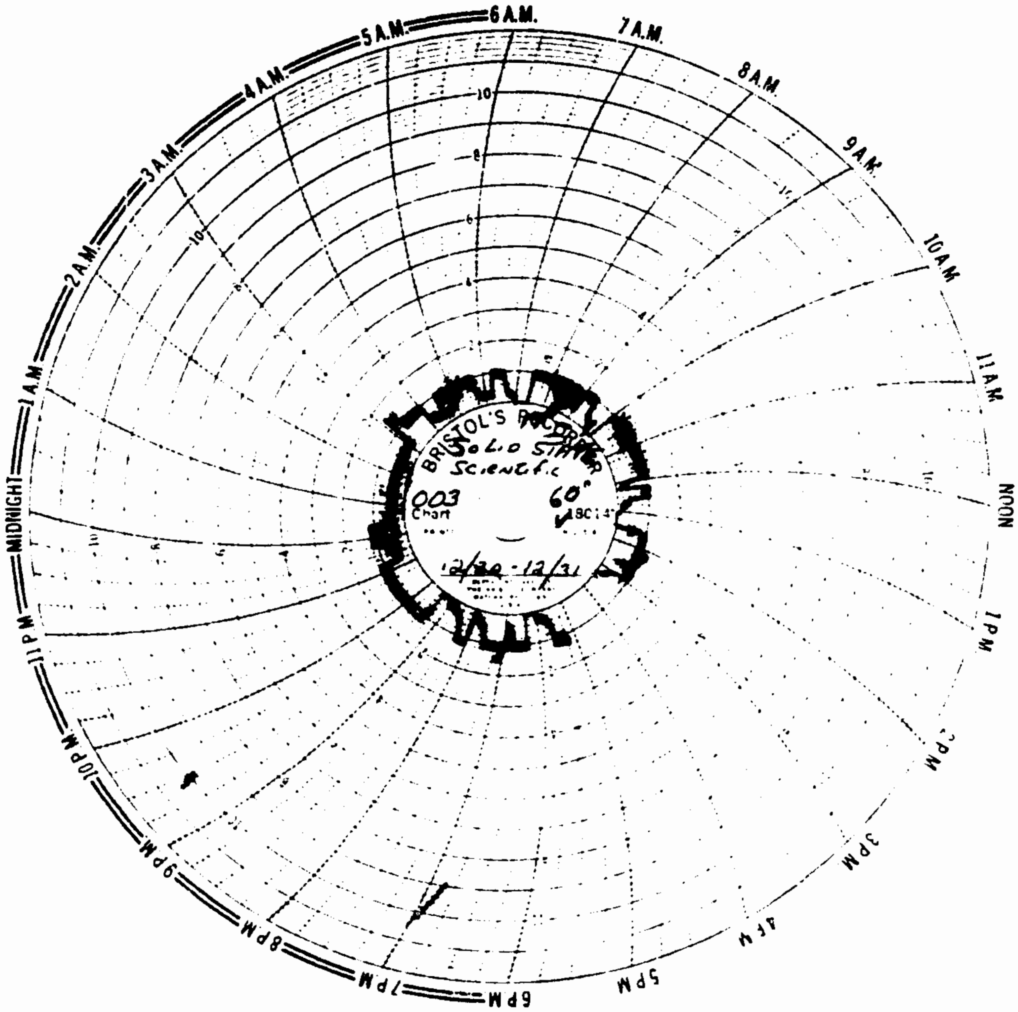
Discharge 002

60° V-Notch Weir

1/6/76 & 1/7/76



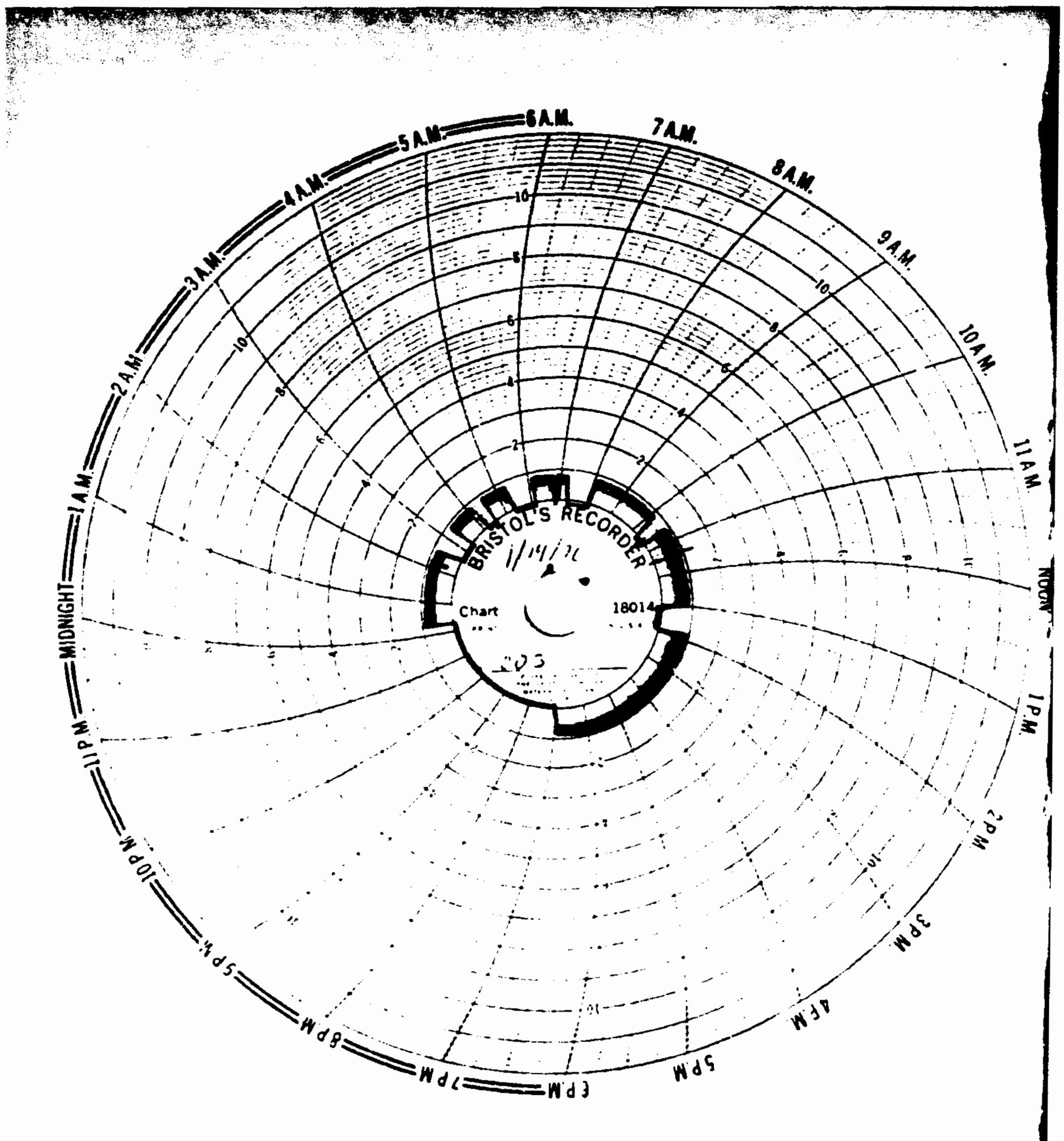
Discharge 003
60° V-Notch Weir
12/29/75 & 12/30/75



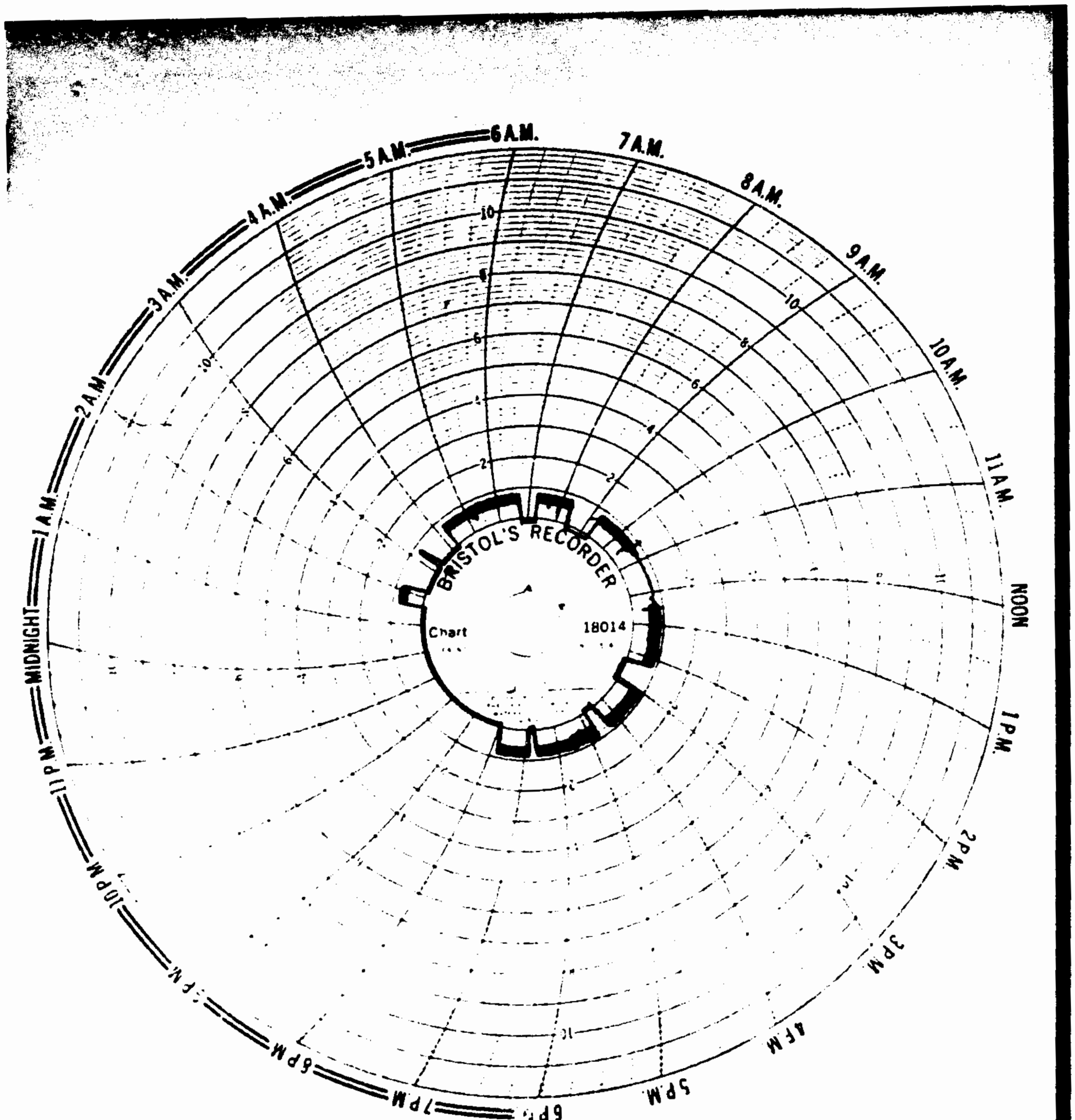
Discharge 003

60° V-Notch Weir

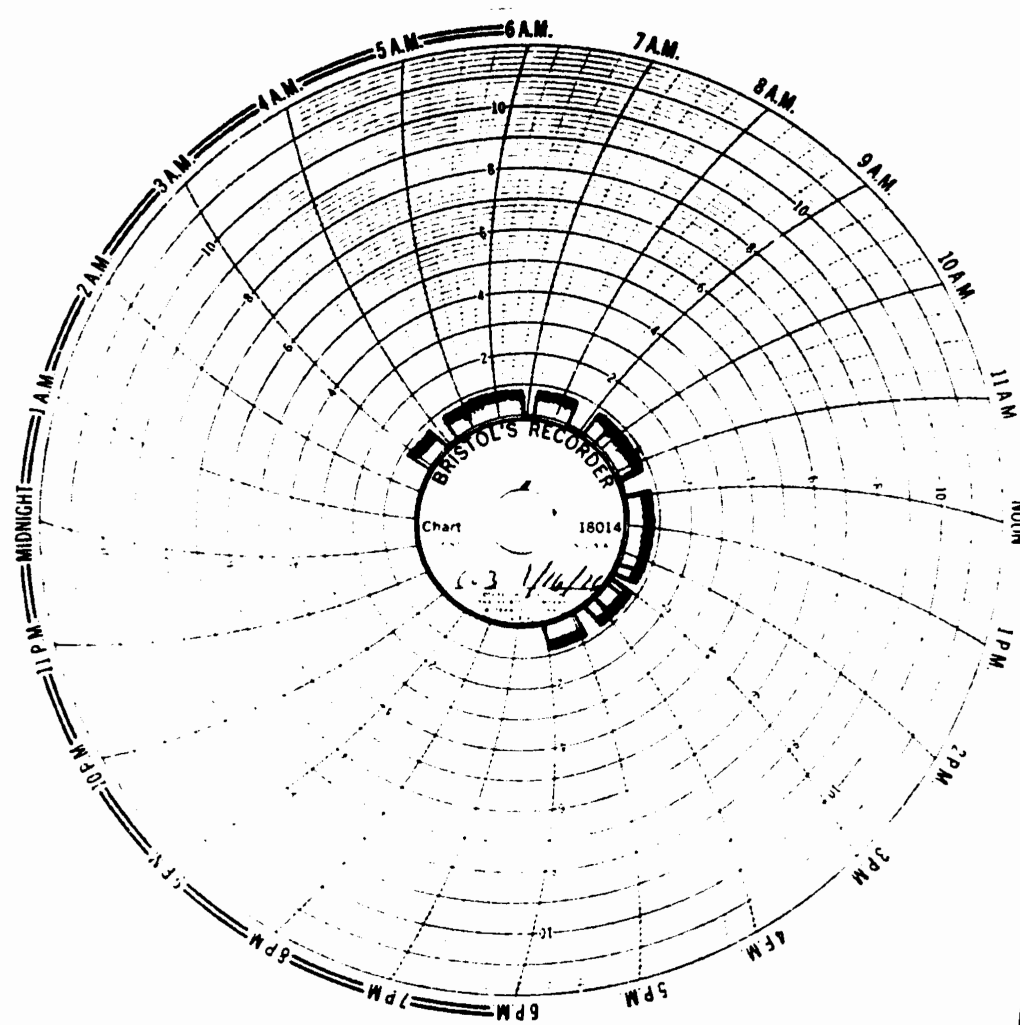
12/30/76 & 12/31/76



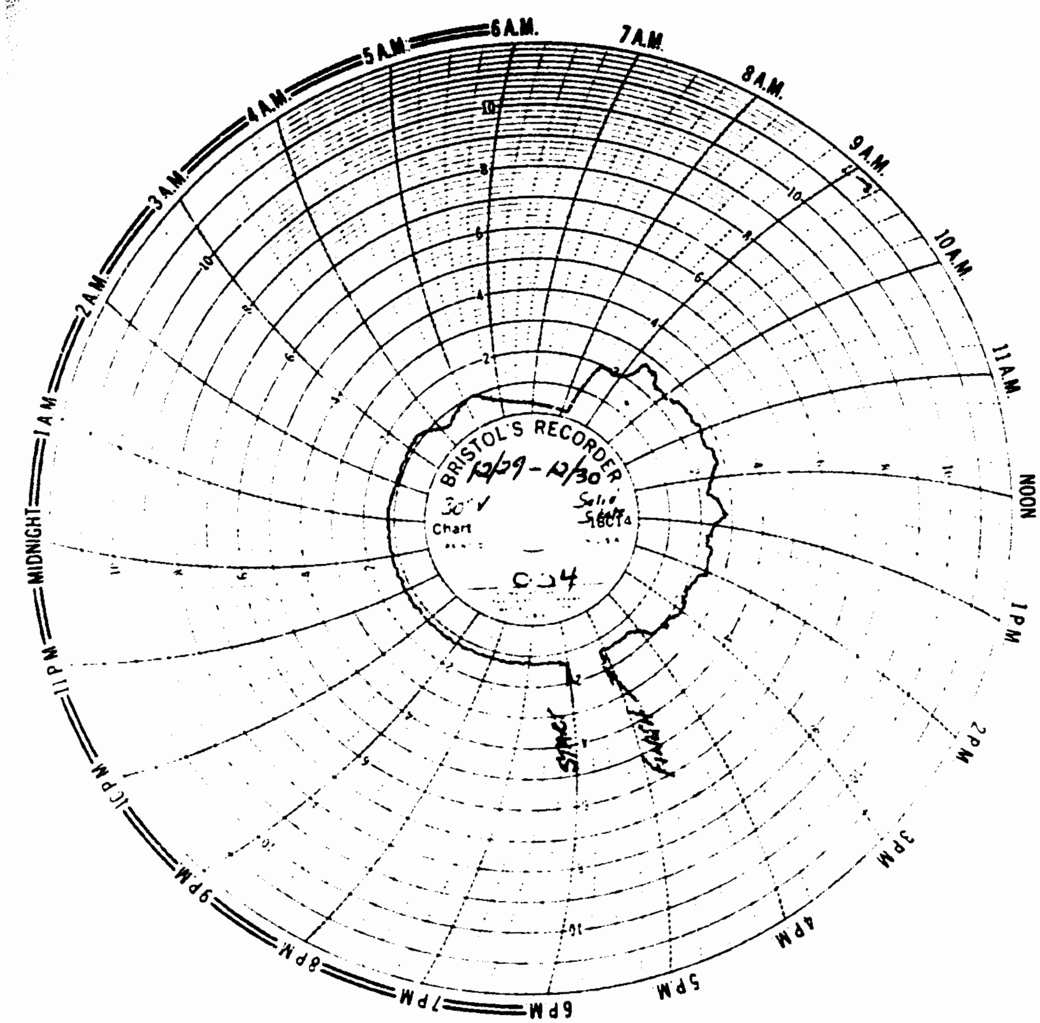
Discharge 003
60° V-Notch Weir
1/14/76



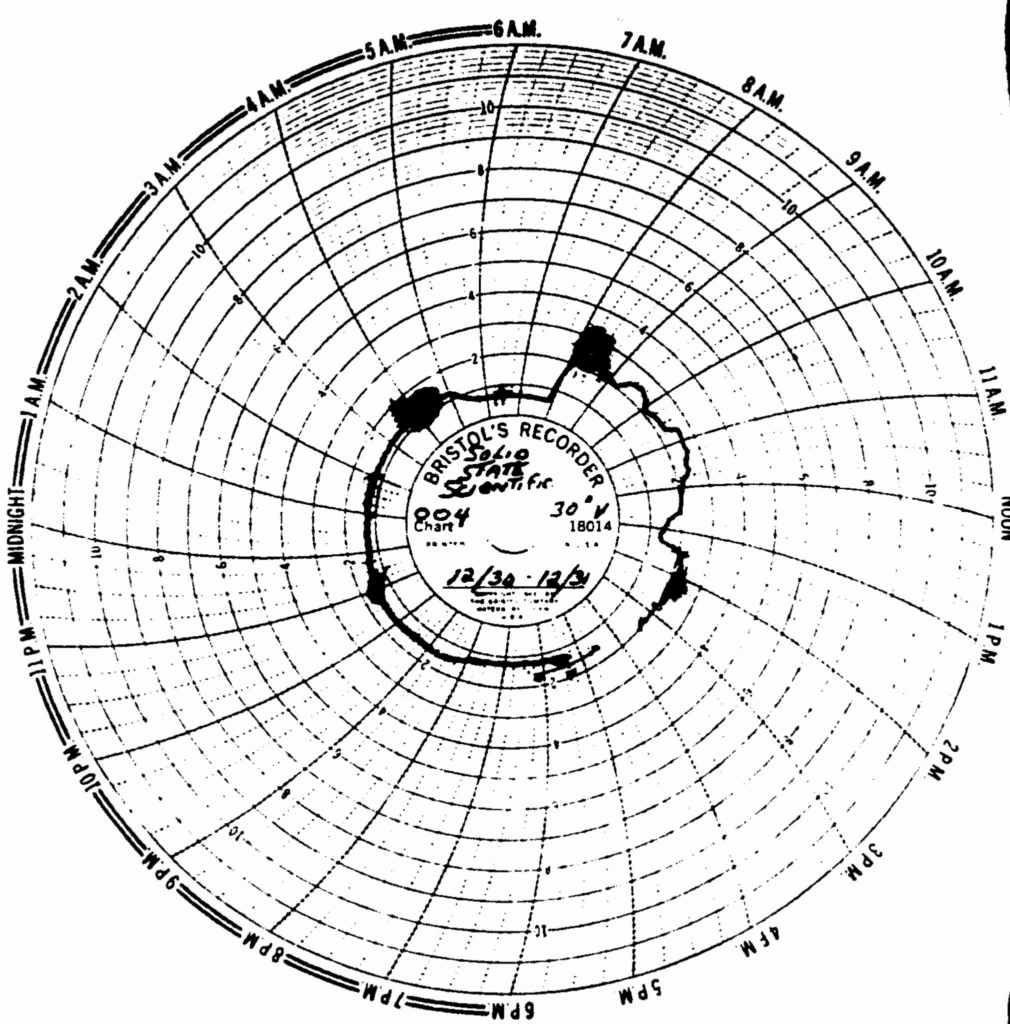
Discha-ge 003
60^{o} V-Notch Weir
1/15/76



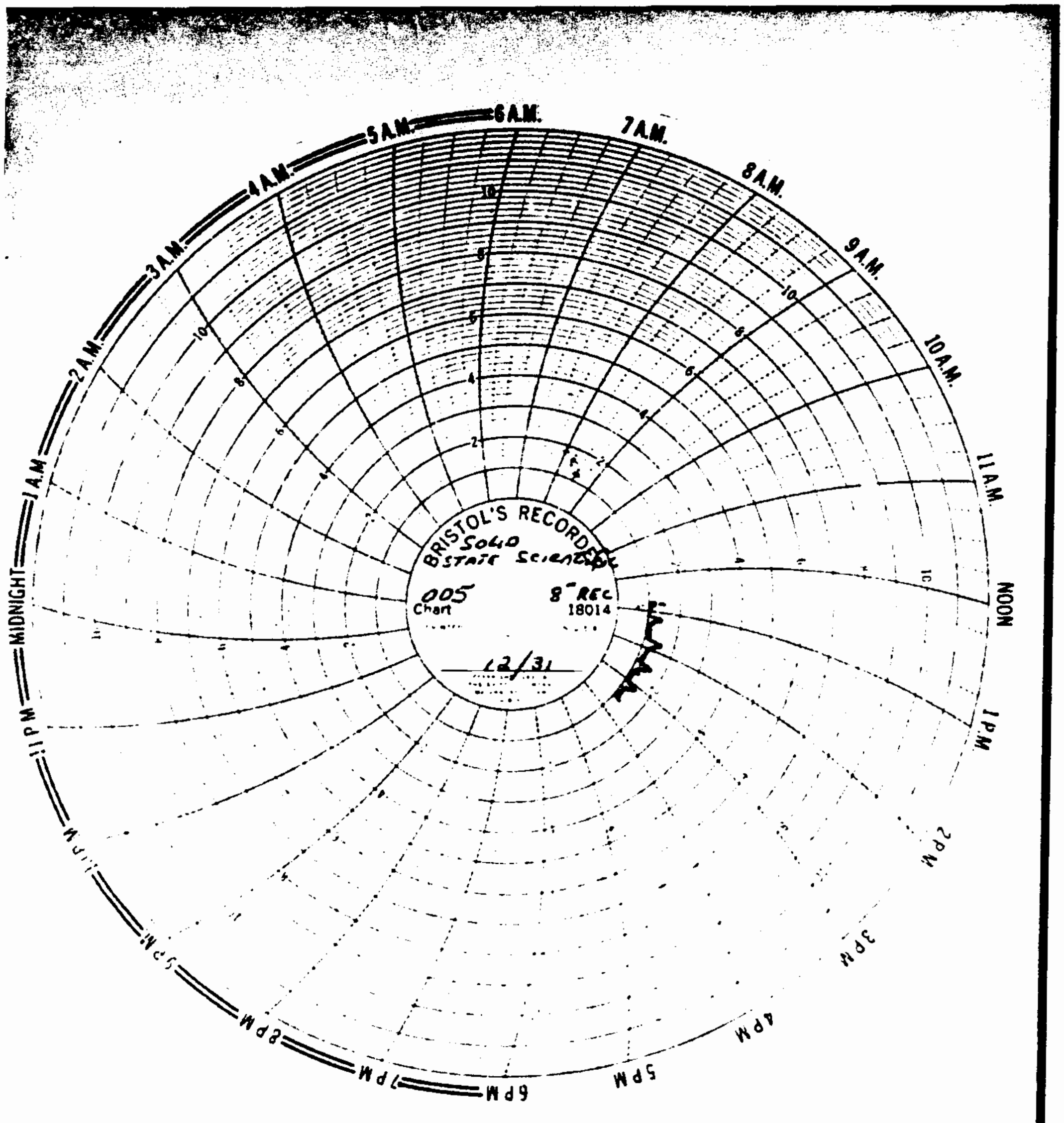
Discharge 003
60° V-Notch Weir
1/16/76



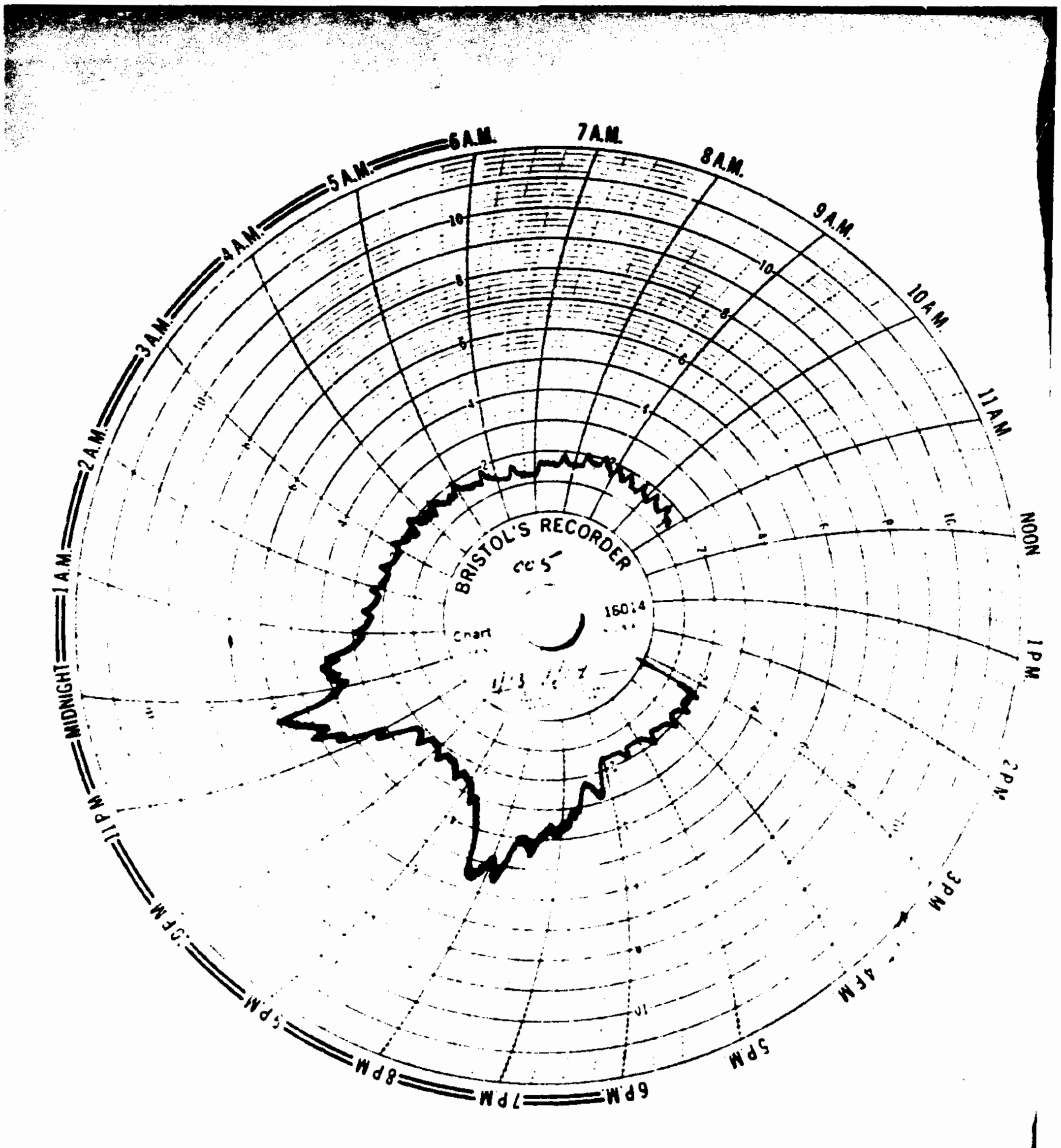
Sample Point 004
30° V-Notch Weir
12/29/75 & 12/30/75



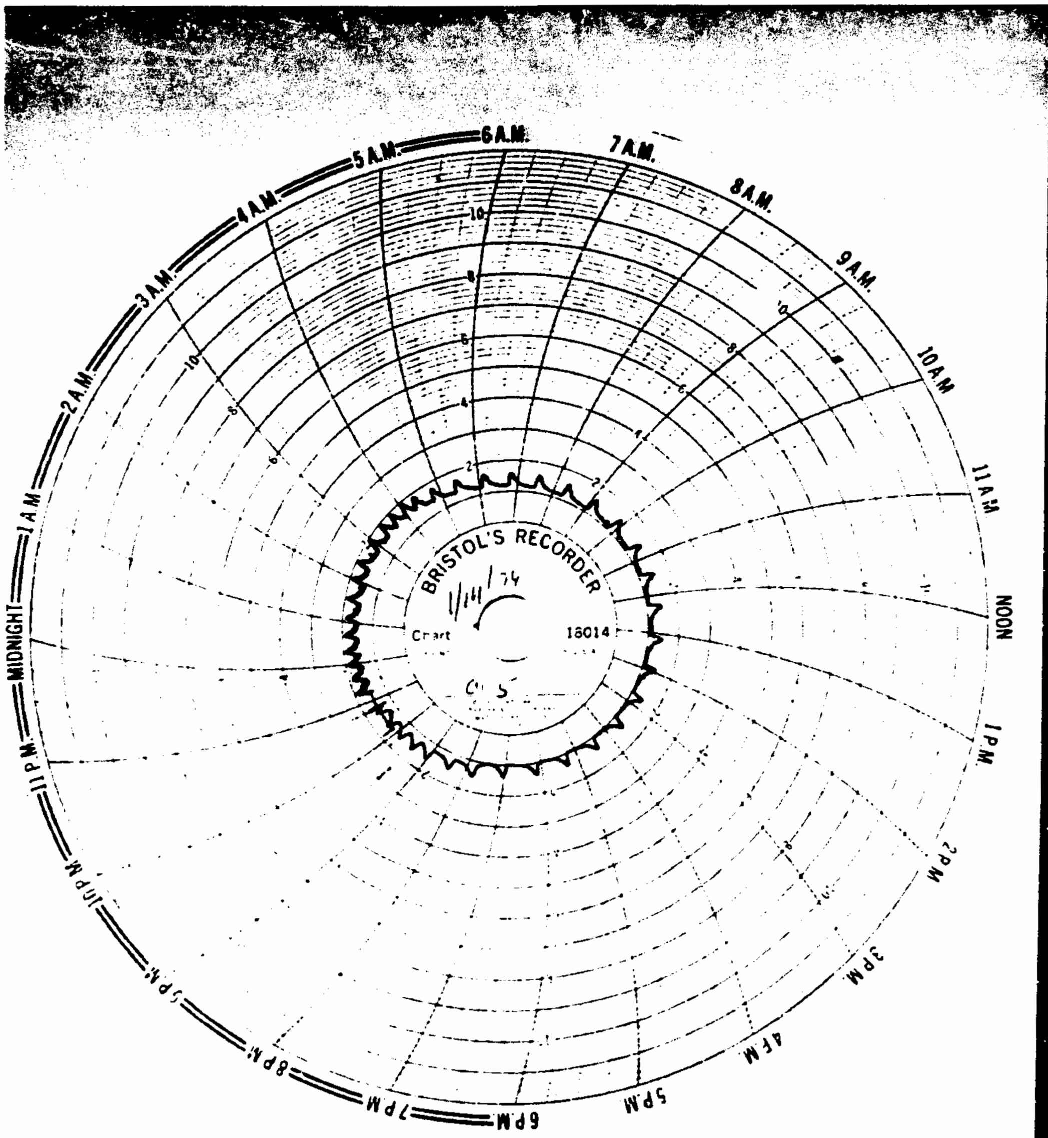
Sample Point 004
30° V-Notch Weir
12/30/75 & 12/31/75



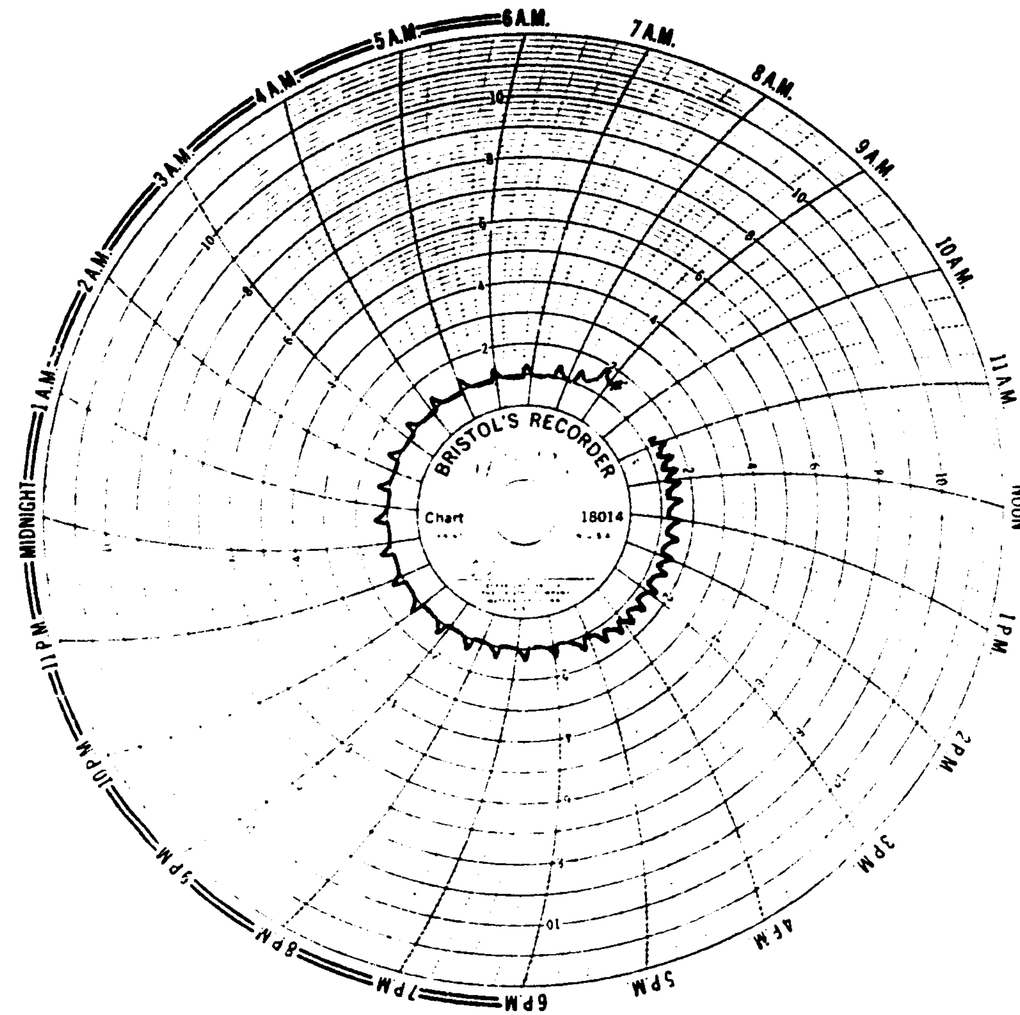
Point 005
8-Inch Rectangular Weir
12/31/75



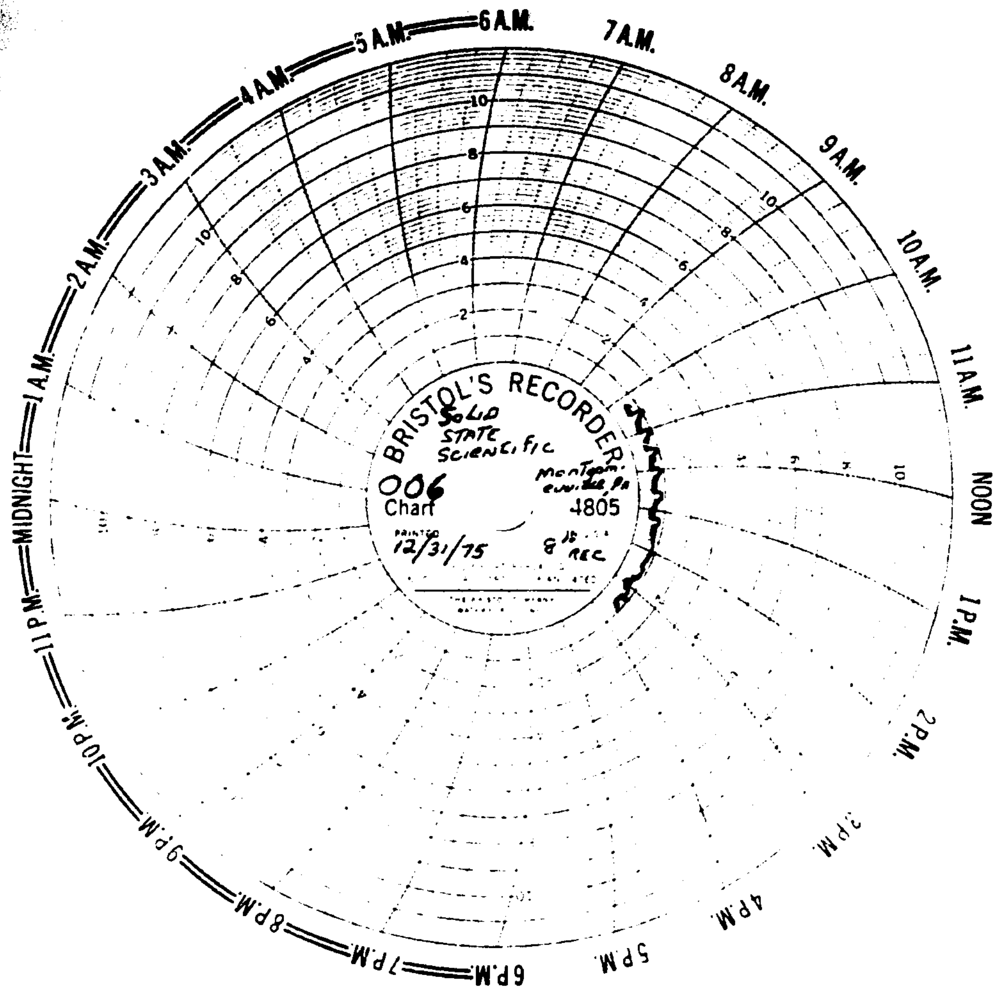
Point 005
8-Inch Rectangular Weir
1/13/76 & 1/14/76



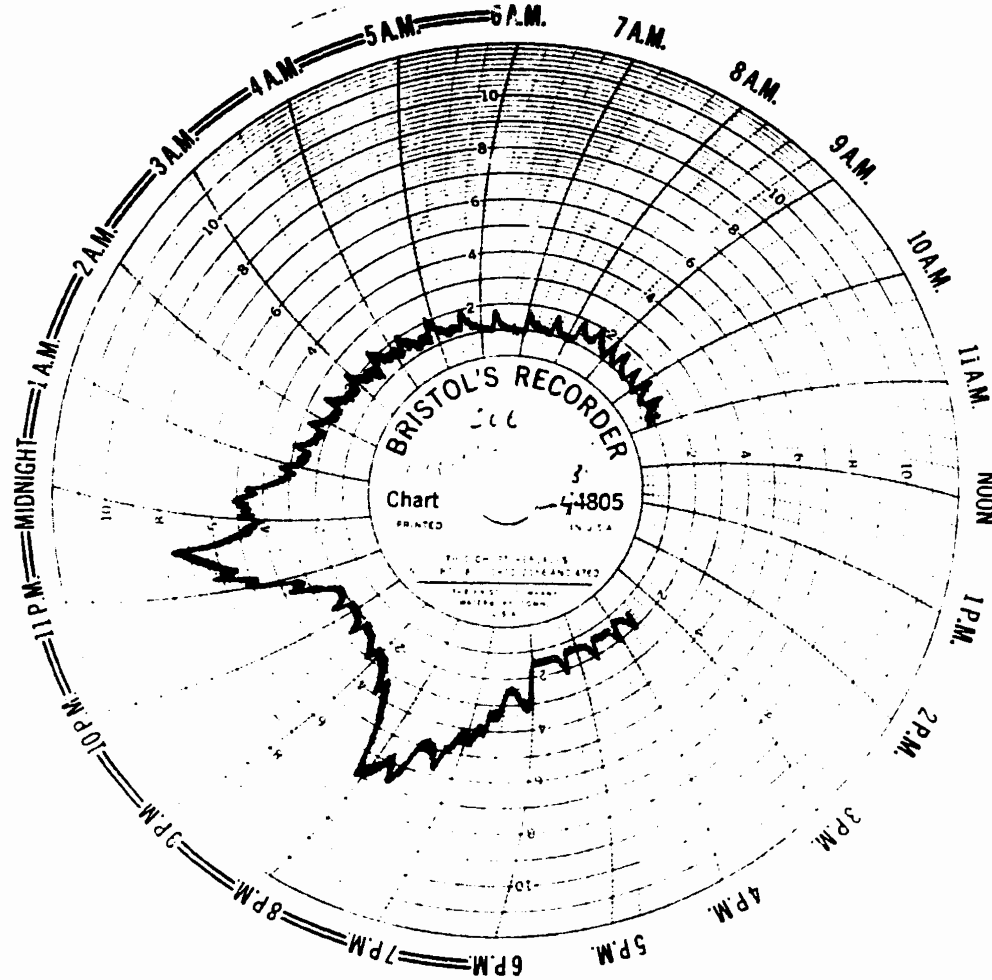
Point 005
8-Inch Rectangular Weir
1/14/76



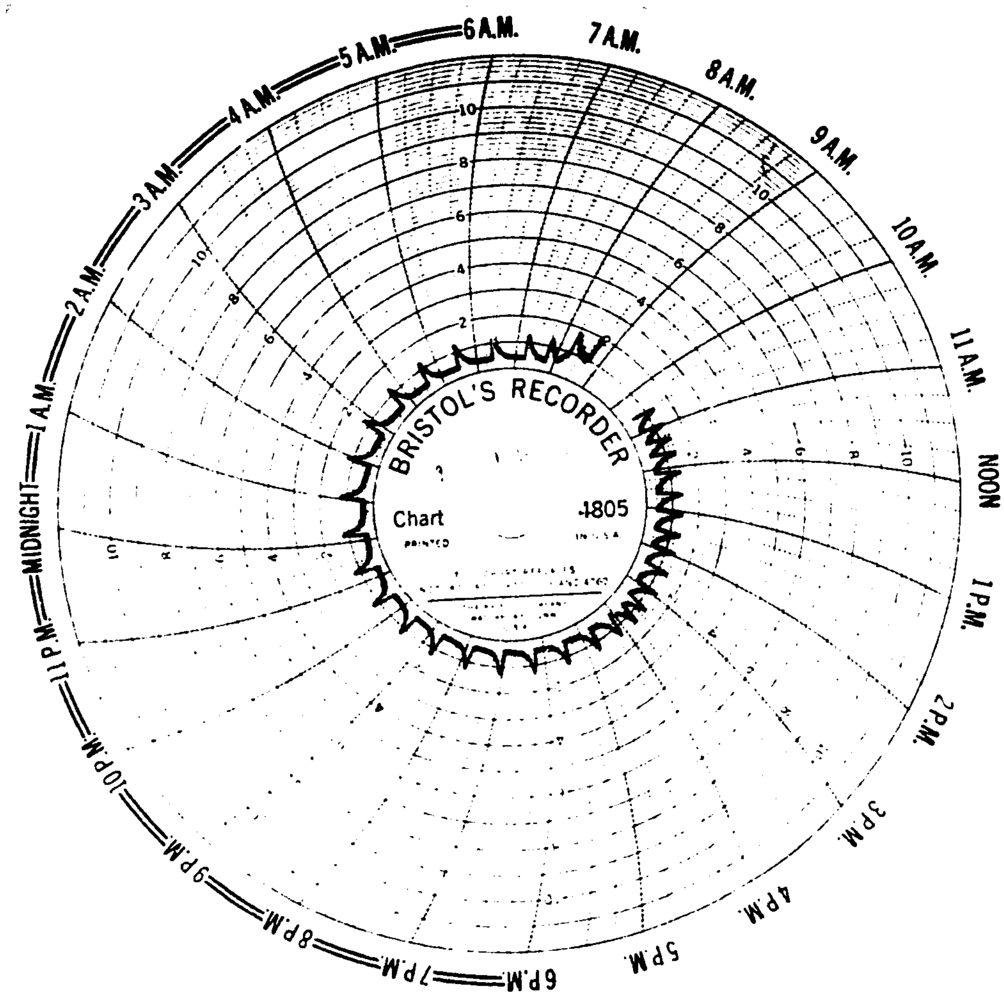
Point 005
8-Inch Rectangular Weir
1/15/76



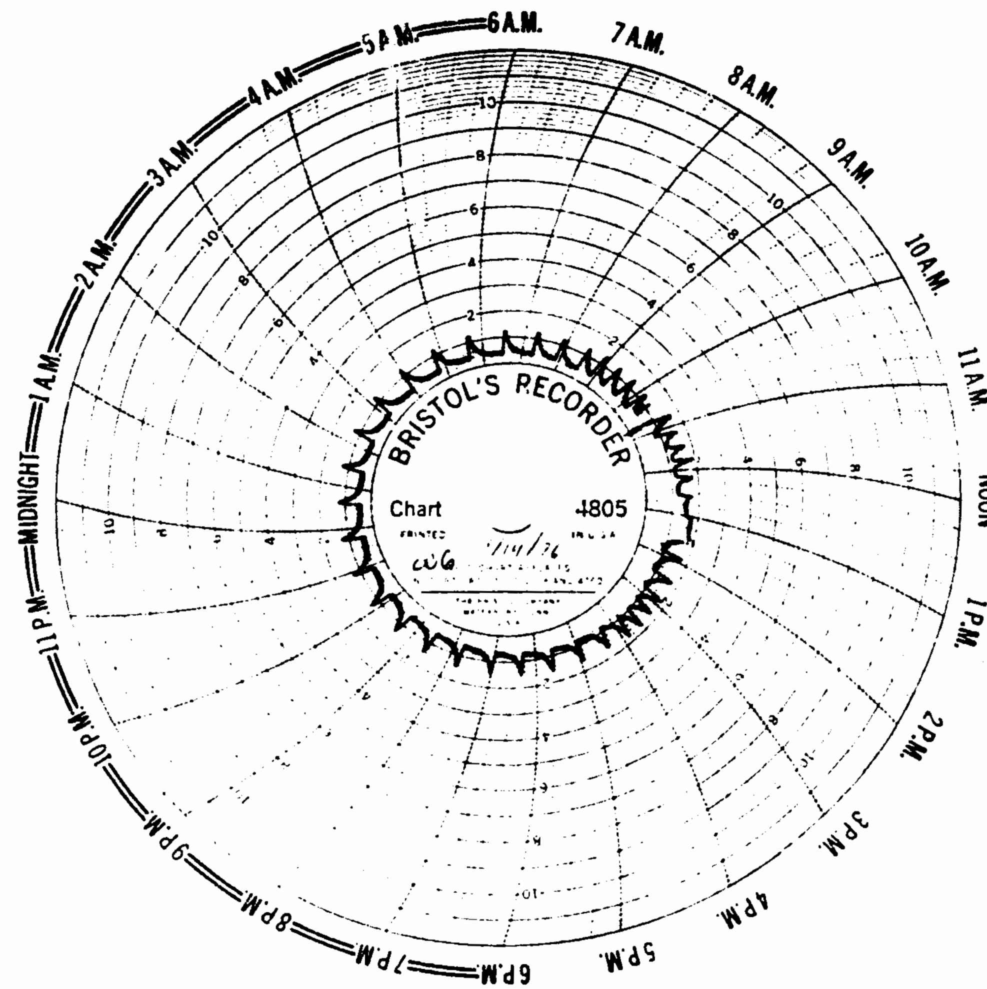
Point 006
8-Inch Rectangular Weir
12/31/75



Point 006
8-Inch Rectangular Weir
1/13/76 & 1/14/76



Point 006
8-Inch Rectangular Weir
1/14/76



Point 006
8-Inch Rectangular Weir
1/15/76